Spring 2019
C-Day

KENNESAW STATE
UNIVERSITY
COLLEGE OF COMPUTING
AND SOFTWARE
ENGINEERING

3rd Place in Computing Showcase

For winning third place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories: Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

RECIPIENT ID

April 25th, 2019

DATE

Best Undergraduate Project

UC-18 BrainChanger Web Application by Garrett Noll (BSSWE), Muhammad Ali (BSSWE), Shahzib Sarfaraz (BSSWE), Caique Costa (BSSWE), Tyler Sperberg (BSSWE), Alessandro Di Gregorio (BSSWE) Advisor: Dr. Reza Parizi

Best Graduate Project

GC-08 Tug Vehicle Aircraft Classifier by Kyle Randall (SWE), JJ Gillian (MSSWE), Frank Domfeh (MSSWE), Andrew Fields (MSSWE), Olu Asabi (MSSWE) Advisor: Dr. Jerry Mamo

Best Undergraduate Research Project

UR-04 Two algorithm comparison by Hao Zhang (BSCS) Advisor: Dr. Kai Qian

Best Graduate Research Project

GR-12 Traffic Load Balancing by Karl Kevin Tiba Fossoh (MSCS), Ganama Hawaou (BSCS), Gregg Hammer (BSSWE), Reza Parizi (Other) Advisor: Dr. Reza Parizi

KENNESAW STATE UNIVERSITY
COLLEGE OF COMPUTING AND SOFTWARE ENGINEERING

RECIPIENT ID

April 25th, 2019

DATE

2nd Place in Computing Showcase

For winning third place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories: Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Undergraduate Project

UC-03 Roses are Red by Dillon Smith (CGDD), Adam Woods (CGDD), Brian Patterson (BSCGDD), Christopher Budden (CGDD), Zared Redding (CGDD) Advisor: Dr. Allan Fowler

Best Undergraduate Research Project

UR-01 Mask RCNN for laparoscopic surgery by Giovanni Bamou Nana (BSCS), Wesley Ellgass (BSCS), Spencer Feeney (BSCS), Marissa Hudson (BSCS), Tristan Leavitt (BSCS), Justin Spaid (XXXX) Advisor: Prof. Pablo Ordonez

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2nd Place in Computing Showcase

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Best Graduate Project

GC-12 Language conversion by Charishma Macherla, Jhilakshi Sharma (MSCS) Advisor: Dr Xiaohua Xu

Best Graduate Research Project

GR-13 Fast Clustering with Density Grids by Daniel Brown, Arialdis Japa (MSCS) Advisor: Dr. Yong Shi

KENNESAW STATE
UNIVERSITY
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ENGINEERING

1st Place in Computing Showcase

For winning third place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories: Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Graduate Project

GC-07 KSU WiFi Monitoring by Chris Garsee (MSIT), Andrew Brooks (MSIT), Pawan Amedi (MSIT), Greg Matthews (MSIT) Advisor: Dr. Lei Li

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1st Place in Computing Showcase

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Best Graduate Research Project

GR-14 BlockChain Drug Counterfeit by Sanjoosh Akkineni (PhD in Analytics and Data Science) Advisor: Dr. Meng Han

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KENNESAW STATE
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ENGINEERING

1st Place in Computing Showcase

For winning third place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories: Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Undergraduate Project

UC-20 ACO: Refreshing Web Presence by Sri Sai Sashank Pyneni (BSSWE), Jay Olsen (BSSWE), Chris Baxter (BSSWE), Chet Sanasith (BSSWE), Deep Patel (BSSWE), Patrick Hughes (BSSWE) Advisor: Dr. Reza Parizi

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KENNESAW STATE
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ENGINEERING

1st Place in Computing Showcase

For winning third place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories: Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Undergraduate Research Project

UR-05 Mask RCNN for laparoscopic surgery by Eric Schneider (BSCS), Jay Clark (BSCS), Leontios Haralambus (BSCS), Justinas Songaila (BSCS), Wade Whitten (BSCS), Oliver Prestridge (BSCS) Advisor: Prof. Pablo Ordonez

RECIPIENT ID

April 25th, 2019

DATE

KENNESAW STATE UNIVERSITY
COLLEGE OF COMPUTING AND SOFTWARE ENGINEERING

Computing Showcase Alumni's Choice Award

For being chosen as the best or most relevant Undergraduate Capstone project by Alumni of the College of Computing and Software Engineering.

UC-21 Using ML to Convey Emotion by Norah Jean-Charles (BSCS), Alex Drennan (BSCS), Gregor Haas (BSCS) Advisor: Dr. Mohammed Aledhari

RECIPIENT ID

April 25th, 2019

DATE

KENNESAW STATE
UNIVERSITY
COLLEGE OF COMPUTING
AND SOFTWARE
ENGINEERING

Spring 2019 C-Day Program

April 25, 2019

Location: Marietta Campus - J (Atrium) and I2 (Design 2) buildings

C-Day Home Page

Return to the C-Day home page.

Spring 2019 Winners

View the Spring 2019 C-Day winners.

Flash Session Presentation

Download the C-Day Flash Session Presentation.

TIME	EVENT
4:00 pm - 4:30 pm J (Atrium) building 1st & 3d floors	Student check-in: J (Atrium) building 1st floor lobby followed by set-up :J (Atrium) building3d floor (presenters only)
4:30 pm - 5:00 pm J (Atrium) building 1st floor lobby	Check-in judges, industry partners, Networking. Students, **bring your resume**.
5:00 pm - 5:35 pm I2 (Design 2) Auditorium	Welcome from Dean Preston followed by Flash Session
5:35 pm - 6:20 pm **J (Atrium) building 2nd and 3d floors**	Judging of Student Projects Browsing
6:20 pm - 6:50 pm J-152 (Atrium) building	Pizza and Networking. Students, **bring your resume**.

6:50pm - 7:00 pm I2 (Design 2) Auditorium	Recognition of Judges
7:00 pm - 7:30 pm I2 (Design 2) Auditorium	Presentation of Awards ◦ Best UndergraduateProject ◦ Best Graduate Project ◦ Best Undergraduate Research Project ◦ Best Graduate Research Project Alumni's Choice Award

Mark Your Calendar For Fall 2019 C-Day: Thursday,December 5, 5-8pm

Judges

- Brian Albertson - IT Control Management Product Owner - State Farm
- Paul Beechner - Lead Systems Engineer - Shaw Industries, Inc.
- Jeff Flowers - Manager, Total Office Support - Aderant
- Jayson Franklin - Senior Director, Information Security Operations - Equifax, Inc.
- Andrew Hamilton - CTO - Cybriant
- Carl Hillermann - Staff Engineer - The Home Depot
- Charles Igwilo - Venture Partner - upSTART Venture Partners
- Michael Isaza - Tech Artist - Hi-Rez
- Steven Lash - CTO - ETTEO Technology
- Jerry Liu - VP, Global Security - Equifax
- Roger N. Mahler - Public Sector/IoT Solutions - AT&T
- Shuchi Mittal - Director, Cloud Enablement - Fiserv
- Disney Nguyen - Senior Quality Assurance - Tripwire Interactive
- Barry Ogletree - Agency CIO/IT Director - Dept of Juvenile Justice
- Vladimir Rusanov - Development Manager - Stanley Black & Decker - CribMaster
- Ambika Shankar - Software Developer - Fiserv
- Bruce Skillin - Technology Innovator - Georgia-Pacific
- Abdul Wahab - Software Developer - State Farm

Alumni's Choice Award

- Andrew Evans - Software Engineer - ETTEO Technology
- Charissa Lucas - Network Engineering/IT Strategy - Georgia Institute of Technology
- Lloyd Middlebrooks - Vulnerability Assessment Senior Advisor - Secureworks

- Torre Sledge - Research Technologist - GTRI
- Abdul Wahab - Software Developer - State Farm

Rubrics and Acceptance Rate —

119 project reviewed, 64 project accepted for presentation (54%).

Best Project in Each Category Rubric

Undergraduate and graduate projects: scale 0- 10with 0representing "Poor" and 10representation "Exceeds Expectations"

- Successfully completed stated project goals and reported deliverables (0-10)
- Methodology/Approach: All required elements are clearly visible, organized, and articulated (0-10)
- Effective verbal presentation (0-10)
- Evidence of Rigor (0-10)
- Merit and Broader impact (0-10)

Games: scale 0 - 10 with 0 representing "Poor" and 10 representation "Awesome"

- TECHNICAL: Technically sound with appropriate visual & audio fidelity(0-10)
- GAMEPLAY: Engaging & Fun, with an intuitive UI. Rules of play are clear. Includes a win/lose state(0-10)
- ORIGINALITY: Sound, Art, Design, or Code(0-10)
- Evidence of Rigor (0-10)
- Merit and Broader impact (0-10)

Alumni's Choice Award Rubric

Alumni Judges will judge the Undergraduate Capstone projects to determine the “best” from those presented. Undergraduate Capstone Project titles start with the letters “UC –“ on their poster.

1. Team Approach: 20 pts (did the team work together effectively to meet goals)
2. Presentation: 20 pts (did the team sell the idea)
3. Use of Technology: 40 pts (is technology being used an effective way)
4. Feasibility/Impact for Business/Industry: 20 pts (doable/valuable/effective)

Academic courses undergraduate (e.g. capstones, games, innovative special topics projects, other course projects) (27) —

*** Candidates for the best project award**
+ Project will be featured during the Flash Session

- **+*UC-01 Forgotten Will**
  by Luke Crowley (BSCGDD),Christopher Plummer (BSCGDD)
  Advisor: Dr. Allan Fowler
  Forgotten Will is an action adventure game, following an adventurer who enters a kingdom to save it from an awakening evil. The game uses a third person perspective as the player uses sword based combat to defeat enemies. Explore the wilderness to discover treasure and look for the entrances of dungeons. Delve into dungeons at your own peril to find better loot and to find items to stop the evil from awakening.
  Merit: We would like to continue to work on this project throughout the year and release it for sale on Steam. Following that, we want to get approved for the Nintendo Developer program and release the game on the Switch.
  Broader Impact: We plan on adding more dungeons to the game and flesh out the overworld more. Dungeons will have new enemies and new items for the player to fight and gather, respectively. Items will unlock new areas for the player to explore, such as using a grappling hook to get across previously blocked off terrain.
  Learn More

- **+*UC-02 Neon Arcade**
  by Adam Woods (BSCGDD),Brandon Moss (BSCGDD), Xavier Summers (BSCGDD)
  Advisor: Dr. Chao Mei
  Neon Arcade is a multiplayer Virtual Reality game that brings classic shoot-em-up gameplay to the VR space like never before.
  Merit: Presenting at the FutureX Live Expo on April 30th in front of hundreds of people.
  Broader Impact: The game will further how virtual reality takes over our culture and our entertainment.

- ***UC-03 Roses are Red**
  by Dillon Smith (BSCGDD),Adam Woods (BSCGDD), Brian Patterson (BSCGDD), Christopher Budden(BSCGDD), Zared Redding (BSCGDD)
  Advisor: Dr. Allan Fowler
  Roses are Red is a cooperative puzzle game where players work together in order to solve puzzles based around color. However the players are afflicted with different types of colorblindness making communication with color difficult. So players must find alternative solutions.
  Merit: This game was made for Educational and Serious game design. It's serious purpose is to have players experience colorblindness and the struggles colorblind people face with everyday communication since colors are a primary descriptor for most people.

- ***UC-04 Ball PunKS:**
  by Dillon Smith (BSCGDD),Stuart Graves (BSCGDD), Patrick Weaver (BSCGDD)
  Advisor: Dr. Chao Mei
  Ball PunKS is a first person team based game where players face off against each other in a match of dodge ball. This game features online multiplayer using Unity and Photon.
  Merit: The intellectual merit of the project was to learn and use online networking functions. Online multiplayer is something almost all games feature and it is beneficial to know how about and how to implement.

- ***UC-05 "Vesta: Absolution", by Firevolt**
  by Brian Patterson (BSCGDD), Christopher Budden (BSCGDD), Austin Huffman (BSCGDD)
  Advisor: Dr. Chao Mei
  "Vesta: Absolution" is a combat-oriented action game developed by Firevolt Studios. Players will take control of a battle automaton whose mission is to purge hostile forces from an abandoned space colony. This game has been in development since August 2018, and we're very excited to show off its progress!
  Merit: Between the gameplay and visuals of "Vesta: Absolution", we aim to reach a higher degree of spectacle than what is expected of student-developed games. We want players of this game to know that it is more than just a school project. In doing so, we are also announcing to businesses that we are a team of developers who will go the extra mile for our work.
  Broader Impact: Naturally, a game does little for people if it isn't fun. We will be taking feedback and criticisms throughout the C-Day presentation. We can then act on that feedback to improve the game and make it even more enjoyable for those who play it.

- ***UC-06 Hacktical Advantage**
  by James Como (BSCGDD),Caleb Mauldin (BSCGDD),Matthew Virga (BSCGDD), Colin Cumberland(BSCGDD), Sean O'Dea (BSCGDD)
  Advisors: Dr. Chao Mei, Dr. Allan Fowler
  In Hacktical Advantage, two players work cooperatively to infiltrate a facility in order to steal vital information while remaining undetected. One of the players, wearing a virtual reality (VR) headset, is placed in a 3-D world as an "Operative". The other player, holding a mobile phone, can view and control a 2-D representation (a mini-map) of the world as a "Hacker". The Operative and Hacker must work together to hack different objects, like locked doors, in order to progress though the world.
  Merit: To our knowledge, no game like this has ever been attempted before. There are many multiplayer mobile and VR games; however no game has attempted to merge the two devices into one unique gaming experience. Additionally, the game does not require a VR headset or a mobile device to work. This helps improve accessibility to people who do not have access to these devices.
  Broader Impact: Players must learn to work together and communicate in order to achieve a common goal. We would like to experiment with different level designs and obstacles in order to observe how players work together to overcome these challenges. This game has the potential to enhance team-building exercises. User testing can help us explore this with more depth.
  Learn More

- ***UC-07 Choromage**
  by Joseph Gillespie (BSCGDD),Steffen Lim (BSCGDD),Anne McCranie (BSCGDD)
  Advisor: Dr Chao Mei
  Choromage is an isometric fantasy role-playing game. The game tells a narrative about how a new wizard Joey learns the ways of magic in this magical world. The game uses world generated scene environments in its open world setting. The narrative allows the player to make their own decisions in morally ambiguous quest lines.

Merit: We do not plan to pursue sell this project or make any financial gains from this game.
Broader Impact: Our game's main benefit to society is to relieve stress.

- **UC-08 Rumblin' Roumbas**
  by Carter Taylor (BSCGDD), Emily Strube (BSCGDD), Harrison Hopkins (BSCGDD)
  Advisor: Dr Allan Fowler
  Rumblin' Roumbas is a vacuum inspired Party Racing Game. The game is designed for casual & serious gamers who grew up enjoying racing games and were forced to vacuum their house. In this game, your goal is to race around the course, while attempting to get first place. We plan to implement courses that immerse the player into the world of a tiny vacuum unit. This means cleaning dust, avoiding solid objects, and performing high-speed racing stunts.
  Learn More

- **UC-09 Educational Website for Lexis Nexis**
  by Eric Tran (BSCS), Chase Aviles (BAACS), Amanda Neal (BAACS), Cindi Simmons(BAACS), Rolando Russell (BAACS)
  Advisor: Dr Ken Hoganson
  The purpose of our project is to enhance the understanding use of LexisNexis HPCC systems through basic tutorials and real-world examples.
  Merit: The merit of our website is that KSU students will be able to reference this material instead of having to search for other tutorials online. Our website will allow students to download the PowerPoints that we are teaching from so that they may approach the lessons at their own pace instead of having to pacing back and forth between tutorial videos found online.
  Broader Impact: Currently we only have KSU students in mind for this website. However, if the instructional material proves useful, the team might consider posting the tutorials online for everyone to use.

- **+*UC-10 The Roommates40Plus Project**
  by Angelica Victoria (BSIT), Jonathan Meakin (BSIT), Ayesha Woodruff (BSIT), Fredy Maqueda-Monroy(BSIT)
  Advisor: Dr. Ming Yang
  Redesigning the website, https://www.roommates40plus.com/, so that it is aesthetically pleasing, user-friendly, and all functions work as they should. Throughout the redesign process, the team made sure that users of the site would be able to message each other through the website with ease. Not only that, but disclaimers and notices were placed where the user would be able to see all the important information first. The function to follow people was also removed as it was an unneeded feature given the purpose of the site (to sell a place for rent and to find a place to rent). Locations of rent by state and city were also organized in a way so that it was easy to read for the user.
  Merit: Through this website, the user will be able to find roommates that are aged 40+. The site is currently free to use and accepts donations to help keep the site running. As the website grows, there is the potential to offer and charge for more services (i.e. through having a monthly newsletter a user can subscribe to).
  Broader Impact: In order to increase the potential benefit from using this project, our team can provide more helpful links and discussions that a renter/landlord may find useful. This is especially helpful for those that are using a roommate matching service for the first time and/or for those who

have never moved before. There is also the possibility for even experienced movers/owners to learn something s/he may not have known before.
Learn More

- **+*UC-12 Smart Access**
- by Broaderick Thayer (BSSWE),Zachary Thayer (BSSWE), Royce Morgan (BSSWE), W.C. Gilbert(BSSWE),Elisabeth Petit - Bois (BSSWE), Jonathan Butler (BSSWE)
  Advisor: Dr. Reza Parizi
  The goal of this project is to create a proof of concept (POC) blockchain network capable of interacting with an end-user in a variety of scenarios in order to deliver a more secure and personable experience. This type of system will aim to prove the potential possibilities of how blockchain can be implemented for other systems as well such as at airports, amusement parks, or offices. This project consists of a mobile application used by a kiosk and mobile phone that checks in a user at a hotel. The system will be built to interact with a kiosk device, sign transactions for a blockchain network, and use Near Field Communication (NFC) to communicate with a lock system to unlock and lock a door.
  Merit: Customers are at the core of all businesses, and leveraging their identity to personalize interactions with them can significantly elevate their experience. For example, consider a scenario, where a hotel guest checks into the hotel with only his/her smartphone and is assigned a room which can be unlocked or locked with just the smartphone. Now, consider a variety of situations where Near Field Communication (NFC) and blockchain combine to create new interactions. Using NFC technology and smartphones now has the potential to securely open a hotel room, fitness room, locker, safe, and much, much more. This project ultimately aims to innovate the hospitality industry by illustrating the potential of blockchain through a proof-of-concept prototype.
  Broader Impact: We have established an innovative foundation by blending NFC and blockchain technology to work with current advances in smartphones. Since we have developed our project in a way that can be adapted into other industries, our next actions to enhance the potential of our project are simple. One of our biggest goals would be to make our system more efficient and faster. Something we have been working on and would like to continue doing is making the system more compatible with a variety of smartphones and key cards to fit the needs of the wide variety of users we could have. Also, we would want to work more on making our system more user-friendly to accommodate different cultures. While we are showcasing a use case suitable for a hotel environment, our design can easily morph into one suitable for airports or fitness centers.

- **UC-13 Bioinformatics and CUDA**
  by Justin Moon (BSCS), Jacob Martinez (BSCS), Jay Clark (BSCS)
  Advisor: Dr. Ken Hoganson
  Combining computer science and biology, bioinformatics is an interdisciplinary approach to address data from genome sequencing. Genomic testing in understanding the pathology of cancer relies heavily on the utilization of multidisciplinary approaches from bioinformatics. In recent years, the constant increase of genomic data has created a strong need for analysis software to perform at an accelerated speed. Lessons from other

examples of large scientific calculations have therefore led to ideas of parallel computing in CPUs and GPUs for bioinformatics. This project will begin with an analysis of existing programs and identify areas of improvement, then followed by subsequent modification and implementation. Students will identify most interesting ones for further research. Selected bioinformatics software will be re-developed to run in Compute Unified Device Architecture (CUDA) environments.
Merit: Provides a backbone and starting point for further bioinformatic data science and research.

- **+*UC-14 Magic Eraser**
  by Yoko Frayer (BSIT),Frank Salcines (BASIT),Thien Pham (BSIT),Mitchell Januchowski(BSIT)
  Advisor: Dr. Ming Yang
  The goal of this project is to create a video editor with some intelligent behavior. Specifically it allows the user to automatically remove unwanted items from a scene. This is accomplished by utilizing Mask R-CNN with pre-trained data for MS COCO. The user is presented with objects it has identified in the scene. Viewing the segmented video, the user can select an item they want to remove. Using the selected mask from the Mask R-CNN network, each frame is fed into an auto-encoder trained for the task of image in-painting. The auto-encoder will essentially "paint over" the selected objects using the contextual information of the image to fill in the gaps. This software can greatly speed up video editing time and essentially create automatic special effects.
  Merit: This program would aid in the post-production of movies by automatically identifying objects and removing them. This would be useful for identity protection and creating special effects.
  Broader Impact: The neural network used to detect objects can be trained to detect specific people or unique objects. Objects in a video could be manipulated in several ways, such as replacing a person with another person. Automatically identifying objects would be useful in security systems and emergency rescue operations. The program could potentially be optimized and modified to run in real-time, which would be useful for real-time applications such as self-driving cars.
  Learn More

- **UC-15 IT 4983 Capstone Group 4 OpenMRS**
  by Jonathan Paez (BSIT),Wayne Warren (BSIT),Aaron Phillips (BSIT),Abayomi Osota(BSIT)
  Advisor(s): Dr. Ming Yang, Dr. Shirley Tian
  Assessment of OpenMRS as an affordable solution for Medical Record Systems and potential cloud-based solutions for developing countries.
  Merit: We have determined that there is a simple, secure, and affordable solution for implementing a medical record system. A clinic or other health service could easily use this to securely store records, manage appointments and share information with other groups.
  Broader Impact: The main goal of this project is to benefit medical groups or organizations in underserved countries. Throughout the project, we constructed our documentation with this in mind. It is our hope that by making this publicly available, some individuals may benefit from an organization utilizing this documentation to help them.
  Learn More

- **UC-16 AWS IoT Architect**
  by Charles Gaar (BSIT), Matthew Gulley (BSIT), Zane Killingsworth (BSIT), Andrew McKay(BSIT), Ibrahim Mohamed (BSIT)
  Advisor: Dr. Ming Yang
  This project, we will architect how to use AWS IoT from locally generated data to IoT. we will create local weather station from Raspberry-Pi and sensors like temperature, rainfall, and wind sensors then send that data to Amazon Web Services Internet of Things. Then, we will connect to different AWS Services like AWS Kinesis Analytic to AWS Lambda services to S3. from here, we will create data visualization from the live data
  Merit: Basic practice of problem-solving learned during the course of studies and understanding how to reapply different types of documentation to make separate projects work together.

- **UC-17 Linux Bioinformatics AppImages**
  by Dustin Harrison (BSIT),Adi Kremo (BSIT),Ashley Surry (BSIT),Jarel Sanders(BSIT)
  Advisor: Dr. Ming Yang
  Bioinformatics is a combination of computer science and biology. Genomic testing in understanding the pathology of cancer relies heavily on the utilization of multidisciplinary approaches from bioinformatics. Students will participate in a project to build a Linux-based academic operating system to accelerate discovery processes in basic research and clinical diagnosis for training and analysis purposes. This project provides an opportunity for students to learn about Linux administration and open-source development by integrating various software packages into a specialized distribution for computational biologists. In addition to traditional installation methods, this specialized Linux distribution should be capable of desktop and cloud-based virtualization (XSEDE, Amazon EC2, Microsoft Azure, and Google Cloud). This distribution will be able to sustain regular updates/upgrades without any impact on the functionality of scientific software. Previous capstone students had success in providing preliminary data for this project and have been gainfully employed in the IT sector. This is a unique opportunity for undergraduate students at Kennesaw State to launch a specialized Linux distribution with potential impact in the field of molecular biology and medicine.
  Merit: This can be used by any company that uses Linux distributions. The AppImages that we have created so far can be used by anyone in the Bioinformatics field. Since AppImages don't require installation they can be used by anyone regardless of how computer savvy they are.
  Broader Impact: Create clear and simple documentation of the process so that it can be replicated by anyone that wants to use the same process. Create documentation to use the automation script. Continue to find a way to streamline the process and figure out an easier way to package the more complicated programs.
  Learn More

- **+*UC-18 BrainChanger Web Application**
  by Garrett Noll (BSSWE),Muhammad Ali (BSSWE),Shahzib Sarfaraz (BSSWE),Caique Costa(BSSWE),Tyler Sperberg (BSSWE), Alessandro Di Gregorio (BSSWE)
  Advisor: Dr. Reza Parizi

This web application aims to improve the attention span of users with ADHD by training the users to maintain focus, improving the activity of the blood vessels in the their prefrontal cortex and subsequently improving their attention span. The application pairs with a Concentrainer headband that measures the user's prefronal cortex blood flow with infrared light, which is interpreted to guage attentiveness by the application. The application can be used to search and watch YouTube videos, and rewards user attentiveness by playing the selected video. Attention is called back as the application pauses the video when attention is lost, prompting the user to maintain focus and improve prefrontal cortex activity through this uninvasive form of training.
Merit: Ideally, our application can be used to aid those with ADHD in improving their attentiveness through training of their prefrontal cortex. Our client plans to offer subscription services for use of the application as well as the Concentrainer headbands that pair with it and his own attention test service.
Broader Impact: Our application will hopefully contribute to the growing field of biometric engineering assisted treatment of diseases and conditions. Hopefully our work can help eliminate attention span deficiency.

- **+*UC-19 VisionBoard app w/ Siri integration**
  by Tanner Haley (BSSWE), Jared Breedlove (BSSWE), Quillan May (BSSWE), Daniel Rivadeneyra(BSSWE), Jai Rai (BSSWE), Clark Bergantinos (BSSWE)
  Advisor: Dr. Reza Parizi
  Interactive iOS application that allows the user to create a vision board, and integrate the user's affirmations/goals with voice using siri in order to promote continuous touch points with their plans and dreams.
  Merit: This project will allow students to reinforce their software engineering skills, and give them an edge with real-world project experience as they prepare to enter careers in the industry
  Broader Impact: With Siri our project will allow the user to access there motivations and affirmations just by speaking to their phone. With the implementation of push notifications, our app will provide constant reminders of the goals the user is looking to achieve. Our application will boost the self confidence and motivation of many people.

- **+*UC-20 ACO: Refreshing Web Presence**
  by Sri Sai Sashank Pyneni (BSSWE), Jay Olsen (BSSWE), Chris Baxter (BSSWE), Chet Sanasith(BSSWE), Deep Patel (BSSWE), Patrick Hughes (BSSWE)
  Advisor: Dr. Reza Parizi
  The purpose of this system is to provide users of the ACT One Cleaning website with a modern, easy-to-use, and responsive website capable of being adequately viewed on desktops/laptops, cell phones, and tablets. The system is sponsored by the client, ACT One Cleaning, and developed and supported by a team of software engineers from Kennesaw State University. The website includes a blog feature, where customers can post and ask question.The website also is Search Engine Optimized to appear in google and other Search Engines. The website also features a scheduling and log in portal, in which customers can log in and schedule appointments.
  Merit: This project helps ACTOne have an increased web presence in the residential and commercial cleaning industry.
  Broader Impact: n/a

- **+*UC-21 Using ML to Convey Emotion**
  by Norah Jean-Charles (BSCS), Alex Drennan (BSCS), Gregor Haas (BSCS)

Advisor: Dr. Mohammed Aledhari
In an effort to assist in an ongoing research project where stakeholders have been interviewed using voice recording platforms and the Empatica E4 wristband to gather biofeedback data, the purpose of this research project in relation to the aforementioned research is to be able to determine the stakeholder's emotional range during a requirements elicitation interview. In doing so, the requirements analyst is supported during the requirements elicitation interview because conveying the emotional range of the stakeholder can help eliminate any miscommunication or misunderstandings between the requirements analyst and the stakeholder due to ambiguity in questions, statements, and responses. Therefore, knowing the range of the emotional state of the stakeholder, in real-time, can allow the requirements analyst to recover or make adjustments to questions (i.e. sensitive topics) during the requirements elicitation interview. The objective is to use supervised machine learning techniques in order to convey an emotional range from the retrieved dataset. To accomplish this, exploring the most efficient machine learning technique for emotion detection for voice recordings and biofeedback data and finding a way to construct or utilize the techniques in an effective manner will be necessary.
Merit: As stated before, collected requirements is a highly difficult task due to the ambiguity that can arise during the interview, among other factors. Besides the capability of the requirements analysts, the response of the interviewee, such as his or her emotional state, plays an important role on the quality of the collected requirements. Emotions such as stress help determine whether or not an interview is successful or not by dictating the level of attention and engagement of the interviewee. Emotions are not always easy to identify by observation. However, they can be detected by looking at various vitals (e.g. rate of blood flow, heart rate, and temperature) and voice parameters. Our research for using machine learning to detect these emotion and allow the requirements analyst to save the interview is very important. Also, helping to clear some of the ambiguity for requirements analysts during the interview and will help advance the NSF project that is currently being conducted.
Broader Impact: We are creating a prototype that others can use to create a comprehensive tool for requirements analyst to use. We hope that it will be able to be intergrated with a web app to be used as a tool for requirements analyst to use during interview in order to detect emotion. This should help lessen ambiguity between the requirements analyst and the interviewee. Therefore, better collection of requirements are possible.
Learn More

- **+*UC-23 Bitcoin Trading using Sentiment**
- by Alex Drennan (BSCS), Marissa Hudson (BSCS), Michael Gibson (BSCS), Breanna Guthrie(BSCS)
  Advisor: Dr. Ken Hoganson
  Using sentiment analysis on Twitter to determine if we should buy or sell bitcoin.
  Merit: Gaining an edge in the bitcoin trade can allow businesses to be able to react to trends more quickly and invest more soundly.
  Broader Impact: We will be back testing our project to ensure that it is profitable and this project can potentially be converted to work with

traditional stocks and help society follow trends.

- **UC-24 Investigating LGBT+ Social Media**
  by Halle Newman (BSIT),Mary Tate Mccreery (BSIT),Kazim Aminu (BSIT),Will Wimby(BSIT)
  Advisor: Dr. Ming Yang, Dr. Shirley Tian
  This project investigates issues in relation to empowering marginalized and vulnerable communities in the digital age and the creative design and use of emerging technologies to promote social innovation. There have been concerns about issues regarding accessibility, bias, social exclusion, cyber-racism, cyberbullying, digital divide, misinformation, usability, and other information sharing hazards in the information and technology experiences of vulnerable groups and populations. The goal is to try to understand their concerns, issues and develop better ways and policies to help them.
  Merit: This project helps those understand what is important to the LGBT+ and their priorities on the site. This can possibly be viewed in a business perspective in regard to marketing by utilizing the analysis to reach out to the LGBT+ community in an informative and understanding way.
  Broader Impact: Through this project we will analyze the major problems of the LGBT+ community on Twitter and come with better policies and guidelines to further their causes and improve upon an online environment that fosters productive conversation and spaces where individuals can voice concerns whilst receiving support.
  Learn More

- ***UC-25 Wholesale Business Data Insights**
  byLawrence D'Addio (BASIT), Jeff Tabet (BSIT), Evan Colegrove (BSIT), Ding Song(BSIT)
  Advisor: Dr. Meng Han
  The goal of this project was to gain insights into wholesale businesses like Amazon and Costco, by analyzing data from their e-commerce websites and their financial reports. Through this analysis we were able to produce data models and determine what allows these companies their success. Hopefully, this information can be used on a smaller scale to help small businesses achieve their own success.
  Merit: The conclusions based on the data and outside research could help to gain insights into better business strategy based on our insight from these two business giants.
  Broader Impact: We would like to use this data and findings to help small businesses achieve similar success to Amazon and Costco.
  Learn More

- **+*UC-26 WASP - Web Security Analyzer**
  by Stephen Samson (BSSWE),Frank Brahmbhatt (BSSWE),Sean Toze (BSSWE), Eric Gray(BSSWE),Parth Patel (BSSWE), Hardi Dadhaniya (BSSWE)
  Advisor: Dr. Reza Parizi
  This system aims to use a modular data gathering architecture to analyze a given company's web security level. The system will process, store, and parse this data into a report that the customer will receive on a periodical basis. This report will aid in advising a company their level of security both overall, and in individual categories. A client can use this security report to not only understand their current state of being, but to improve upon it if dissatisfactory.
  Merit: This software system will allow users to graphically see the

shortcomings in their cyber security hygiene.
Broader Impact: The use of this software system will have the ability to improve the cyber security of companies all across the United States.

- **UC-27 CINC PTO Application**
  by Branden Morgan (BSSWE), Amnah Ilyas (BSSWE), Colt McKissick (BSSWE), Tyler Whitfield(BSSWE), Raaziq Whyte (BSSWE)
  Advisor: Dr. Reza Parizi
  Developed a PTO Web Application tracker for Human Resource usage - to track employee requests for time off.
  Merit: Assist Human Resources in reducing paper trail and footprint.
  Broader Impact: Develop for customizable use across any company with easy to use customization tool.

Academic courses graduate (e.g. capstones, games, innovative special topics projects, other course projects) (17)

*** Candidates for the best project award**
+ Project will be featured during the Flash Session

- ***GC-01 Android App-based Home Automation**
  by Rehnuma Afrin (MSCS), Sai Kosaraju (MSCS)
  Advisor: Dr. Mohammed Aledhari
  Creating an Android app to control LED connected to the ESP32 and for theft detection system using proximity sensor FC-51. For the ESP32 programming, TUNIOT FOR ESP32 has been used and MIT app inventor 2 to create the android app. Both are online tools and blocks-based programming.
  Merit: The implementation took around $20 .If this Home Automation System can be implemented for the household loads, it will reduce the utility bill significantly as long as the devices are in function.
  Broader Impact: The theft detection system can be extended by Integrating a camera to sense possible threats such as - unexpected human presence. This will require the implementation of image processing techniques to train the theft detection system with the required dataset. The theft detection System will then send the captured images to the user through cloud computing whenever any possible threat is detected.

- **+*GC-02 Cluster Analysis Algorithms for Web**
  by Kavya Bezugam (MSCS), Nikhitha Gaddamidi (MSCS)
  Advisor: Dr. Xiaohua Xu
  Several feature subset cluster selection algorithms have been introduced and studied for machine learning applications. They are Wrapper, Embedded, Hybrid, and Filter approaches. The wrapper approach uses the predictive accuracy of predetermined learning algorithm to estimate the accuracy of the selected clusters, the accuracy of the learning algorithms is usually high and complexity is large for computation. The embedded approach uses the selection as a part of the training process and are specific to the learning for the algorithms under consideration, hence they may be more accurate than the other three approaches. The hybrid approach is a combination of wrapper and filter approaches by using a filter method to reduce search space that will

be considered by the subsequent wrapper. They mainly focus on combining filter and wrapper approaches to obtain best performance with a particular learning algorithm under similar time complexity for the filter approaches. The filter approach is independent of learning algorithms, with good generality and the complexity is low for computation, but the accuracy is not guaranteed for the learning algorithms. Filter approaches are usually a good choice when the number of dimensions are very large. The data on web is large, heterogeneous and unpredictable. Thus, we will focus on the filter approach. With respect to the filter feature clustering selection approaches, the cluster analysis application has been demonstrated to be more accurate and relevant than the traditional feature selection cluster algorithms. Feature selection involves identifying a subset of the most useful features that produces compatible results as the original entire set of features. A feature selection algorithm may be evaluated from both the efficiency and effectiveness points of view. While the efficiency concerns the time required to find a subset of features, the effectiveness is related to the quality of the subset of features. Based on these criteria, a fast clustering-based feature selection algorithm (FAST) is proposed and experimentally evaluated in this paper. The FAST algorithm works in two steps. In the first step, features are divided into clusters by using graph-theoretic clustering methods. In the second step, the most representative feature that is strongly related to target classes is selected from each cluster to form a subset of features. Features in different clusters are relatively independent; the clustering-based strategy of FAST has a high probability of producing a subset of useful and independent features. To ensure the efficiency of FAST, we adopt the efficient minimum-spanning tree (MST) clustering method. The efficiency and effectiveness of the FAST algorithm are evaluated through an empirical study. Extensive experiments are carried out to compare FAST and several representative feature selection algorithms, namely, FCBF, ReliefF, CFS, Consist, and FOCUS-SF, with respect to four types of well-known classifiers, namely, the probability based Naive Bayes, the tree-based C4.5, the instance-based IB1, and the rule-based RIPPER before and after feature selection. The results, on 15 publicly available real-world high-dimensional image, microarray, and text data, demonstrate that the FAST not only produces smaller subsets of features but also improves the performances of the four types of classifiers.
Merit: It reduces the search time by simplifying the complexity of algorithms.
Broader Impact: We are trying to improve the learning capacity of the algorithm.

- **+*GC-03 Tag: The game**
  by Karl Kevin Tiba Fossoh (MSCS), Maxwell Lavin (MSCS)
  Advisor: Dr. Selena He
  Tag: The game takes the concept of laser tag and brings it to the conviviality of our smartphones. Using the powerful receptors in our day to day phones, we decided to push them to their limits and create a game really similar to a laser tag game but with the use of localization and compass, along with a powerful backend to handle the different players on the platform.
  Merit: Like any game, it includes a lot of new development techniques along as ideas that came from diverse areas. Our main inspirations are laser tag and paintball, with the fast pace and entertaining nature of those games. We, therefore, decided to implement a game for mobiles that brings the fun to us, anywhere we are.
  Broader Impact: The capacity to make this game competitive could push the creation of pop-up events. Their revenue could be given back to charity and

local communities.

- **+*GC-04 Raspberry Pi Object Detection**
  by Daniel Karasek (MSCS), Rachel Wendel (MSCS), Linda Vu (MSCS)
  Advisor: Dr. Mohammed Aledhari
  This project is designed to be a solution for low-cost at-home inventory management. The project itself uses a Raspberry Pi, Pi Camera, and Python. The camera captures an image of objects pre-trained in a data model and counts how many objects are in the image. This process can be repeated for multiple images. It sends notifications saved as text strings to a mobile phone. The notifications contain the objects detected and the quantities of said objects. The software within Python used for the actual object detection are OpenCV, MobileNet, and SSD. OpenCV is the Open Source Computer Vision Library that has a Python interface. MobileNet and SSD are combined to handle the object recognition as SSD can handle multiple object detection. The combination of MobileNet-SSD uses the COCO data set as the recognized objects.
  Merit: Many current inventory management solutions contain spreadsheets that must be updated manually. Our project is implemented as an automated solution that can auto-fill spreadsheets. Although our concept is designed for at-home use, our project can be used by a business for inventory management. Additionally, our project contains code that calibrates the object detection code. Our code is based on the official Tensorflow API documentation for using OpenCV, and the Tensorflow API documentation code does not include any calibration to filter out false positives. Our calibration API provides a new, unique way to more accurately detect objects.
  Broader Impact: We are providing the entire project online via a Github repository with a comprehensive ReadMe that describes the implementation and lists all resources used to build the project. As our project is meant to be used in the home, we want access to the code to be public and easily readable. Future work on this project will include a better communication system for sending object counts to other devices such as phones, a script bot to help with ordering replacement objects for detected objects that are running low, and looking at creating an interface that goes beyond using a development environment for use.
  Learn More

- ***GC-05 Visualization of Food Security**
  by Alejandro Sanchez (MSIT), Alicia Estabrook (MSIT),Carole English (MSIT), Chelsee Dickson(MSIT), Nasiya Sharif (MSIT)
  Advisor: Dr. Lei Li
  Our project measures the impact of a country's food security level on secondary enrollment and the generation of income through the education channel. We have created a website that displays a homepage, which details the aims and goals of this project, as well as a heatmap that visualizes food security and secondary school enrollment world wide. The heatmap, an interactive web-based tool, displays a geographic map of the world. Users are able to click on a country and receive information about said country, including its policy strengths and weaknesses from the perspective of a social market economy. By manipulating attributes from a drop-down menu located to the left of the map, users can simulate the impact of policy changes on the economic growth trajectory of their chosen country. Data for each country

and attribute has been provided by our project owner, Dr. Marcus Marktanner. The attributes in our project include schoolOECD, which displays the Secondary Net Enrollment; waste, which displays the Level of Food Security; InyUN, which displays the GDP per Capita; GINIW, which displays Inequality; and polity, which displays the Level of Democracy. Once a user selects a country within the map, a bar chart, scatter plot, and data table are displayed, populated with information based on the selected attribute in relation to the chosen country. All three visualizations compare the chosen country's data with both data from the region and the world, allowing users the ability to gain an in-depth understanding of our data. Beneath these three visualizations are two Shock Scenario graphs: they allow users to 'shock' the level of food insecurity to visualize its impact on Net Secondary Enrollment and GDP Per Capita by inputting a new value within a textbox located above the graphs. To receive results, users must select go. Our project consists of multiple aspects of functionality, interactivity, and web page design and development. We have utilized many of the tools we have learned throughout our courses in the MSIT program to ensure our webtool is effective, user friendly, and aesthetically pleasing. The members of this team include: Alicia Estabrook, Carole English, Chelsee Dickson, Nasiya Sharif, and our team lead, Alejandro Sanchez.
Merit: The intellectual merit of our project stems from its noble pursuits; namely to visualize food security around the world in an effort to educate users on the global level of food security. Our project allows users to see and analyze how food security levels compare to the region of a selected country, as well as the world in its entirety, simulating how policy changes impact the economic growth trajectory of a country.
Broader Impact: In order to enhance the potential of our project to benefit society, we can share our data, visualizations, and analysis with an audience that is interested and willing to gain an in-depth understanding of food security around the world. In this way, our audience will hopefully become better educated as to the impact of policy changes and economic growth on a country's food security, which in turn may spark their interest to conduct further research.
Learn More

- **+*GC-06 Georgia Tech Parking Maint. Portal**
  by Joseph Richardson (MSIT), Emmanuel Aku (MSIT), Izabel Ivanova (MSIT), Sajina Vinaykumar(MSIT)
  Advisor: Dr. Lei Li
  A web portal for the documentation and tracking of parking maintenance issues and tasks with an emphasis on capturing accurate location information and mobile device usage.
  Merit: This solution could improve the maintenance productivity of any organization, public or private, that maintains large amounts of parking. With the potential for expansion into capturing and maintaining parking space inventory, it may be able to integrate with widely adopted parking management systems such as T2. This can provide leadership with much more accurate information about their primary commodity, parking spaces. This can benefit any parking organization by better utilizing their inventory.
  Broader Impact: This project has the potential for expansion. As originator of the idea, primary developer, and liaison for GT Parking, I would like to continue working on this project to include the capability of capturing and maintaining parking space inventory. Regardless, I plan on presenting this project to my directorship and IT organization for their consideration. I will also be attending

a Georgia state parking conference where I will demonstrate the solution to individuals for feedback and possible presentation at the next conference.
Learn More

- **+*GC-07 KSU WiFi Monitoring**
  by Chris Garsee (MSIT),Andrew Brooks (MSIT),Pawan Amedi (MSIT),Greg Matthews(MSIT)
  Advisor: Dr. Lei Li
  Monitoring Wi-Fi data using Raspberry Pi devices to gauge the end-user experience for wireless. Endpoints will collect wireless connectivity data including but not limited to signal strength, latency, link speed, and other relevant data. The data from the Raspberry Pi devices will push the data back to a Linux based server. The data is then stored in a database. This data can be viewed in a graphical user interface to monitor these devices in real time.
  Merit: Monitoring Wi-Fi data using Raspberry Pi devices to gauge the end-user experience for wireless. Endpoints will collect wireless connectivity data including but not limited to signal strength, latency, link speed, and other relevant data. The data from the Raspberry Pi devices will push the data back to a Linux based server. The data is then stored in a database. This data can be viewed in a graphical user interface to monitor these devices in real time.
  Broader Impact: This project was created to help KSU ITS to be proactive in dealing with wifi issues across KSU campuses. The data that will be provided can help the KSU ITS solutions to current issues, whether to replace access points or add more access points in critical area around campuses.
  Learn More

- **+*GC-08 Tug Vehicle Aircraft Classifier**
  by Kyle Randall (MSSWE),JJ Gillian (MSSWE),Frank Domfeh (MSSWE),Andrew Fields(MSSWE),Olu Asabi (MSSWE)
  Advisor: Dr. Jerry Mamo
  The Tug Vehicle Aircraft Classifier is an Android application for use by Textron GSE in their line of Tug Towbarless aircraft towing vehicles. The application uses machine learning image classification to recognize different types of aircraft tires and alert the vehicle operator as to what towing setting to use when towing the aircraft.
  Merit: This project will allow users of the Tug Towbarless Aircraft Towing vehicle to automatically identify which towing setting to set the vehicle to without having to manually inspect the aircraft.
  Broader Impact: The system will allow users to quickly tow vehicles, increasing efficiency and lowing error rate, leading to faster aircraft maintenance response on aircraft tarmacs. In future iterations, the system will use external cameras mounted on the back of the vehicle for classification.
  Learn More

- **+*GC-09 Black Friday Sales**
  by Sreevalli Priyanka Yellanki (MSCS), Soujanya Gourisetty (MSCS), Priyanka Reddy Thumati Narayana Reddy (MSCS)
  Advisor: Dr. Mingon Kang
  Project deals with identification of Purchase Pattern from its customers on various products from a retail store during Black friday sale. Considering the data set from Retail Store on a black friday sale , customer purchase behavior is evaluated using a few methods for at most accuracy. Dataset is being

considered from kaggle platform which consists of 537K samples with 11 independent features and 1 dependent variable. The goal of our problem is to find the customer purchase behavior against different products i.e., the amount of purchase made by the customer.
Merit: 1) Intensity of increase in the sales revenue and product market with the implementation of this project is the key motivation factor 2) Productivity increase with in-depth understanding the purchase trends helps the retail store. 3) Improved efficiency with various design strategies pertaining to the purchase trends is a value adds to the retail store. 4) Better Management of resources and easy availability of goods can be excelled with the help of the project.
Broader Impact: We are also trying to improve the accuracy by adding Purchase Cost monthly on products that helps in identifying the sales each year with respect to its purchase cost and in which city what age people shop most, what products category needs to be kept in stock more in order to increase sales, which occupation customers shows interest in what kind of available categories. These would be a productive value addition for retail store to adjust the purchase cost of a product for increased sales. Retail store can also design strategies to promote products that were sold heavily in the previous years. It can communicate the trends to its appropriate customers to increase the customer base.

- **+*GC-10 Santander Transaction Prediction**
  by Md Arabin Islam Talukder (MSIT), Priyanka Velumani (MSCS), Sanju Timsina (MSCS)
  Advisor: Dr. Mingon Kang
  Every bank wants their customer to make regular transaction. In this project, identifying whether the customer will make the future transaction is the main objective. With this knowledge, bank can use some method to approach those customers who are not going to make future transactions. Using this approach they may be able to reduce customer churn. Dataset for this project is provided by Santander Bank. The data is provided in the kaggle platform for Santander Customer Transaction Prediction. The dataset is anonymized containing numeric feature variables, the binary target column, and a string ID_code column. The data provided has the same structure as the real data available to solve the problem. It consists of test and train dataset. The train dataset consists of 200K samples and 200 features. The target value is categorical variable having value 0 and 1.
  Merit: Machine learning algorithm is core of solving future problem now a days. Data analytics and data scientist are continuously using machine learning algorithm to make human life easier and better. With the use of data science now big companies can predict their product value before launching it to market. Bank and financial institution can predict their customer traffic. For example, the dataset i am using in this project is a transactional dataset of Santander Bank. They provided this dataset on Kaggle big data competition website. They want to predict their future customer who will do the transaction. Using machine learning algorithm we can easily predict that which users will do the future transaction by analyzing the training dataset. We have to select a valuable and best model for the prediction using this training dataset.
  Broader Impact: This project is going to help the financial institutions to predict their future customer. Based on the result of this project they can modify their business strategies to increase their users. For example, the training dataset contains 200 feature variables. This 200 feature variables are

user input means their activity to the bank. Based on these activity they did their transaction with Santander bank. By analyzing this dataset bank will find the number of actual users. Bank will also get to know that which activities of their institution is being used by the customers most. They will get a way to improve their existing service or can add new service to increase customer. This data analysis will also help the bank to emphasis on those activities(feature variables that has highest variation) to attract customers to them.

- ***GC-11 EFFICIENT VEHICLE PARKING PLAN**
  by Shwetha Adoni Prasad (MSCS), Srivatsa Mallapragada (MSCS), Shweta Khandal (MSCS)
  Advisor: Prof. Lee Seokjun
  We all do face a lot of parking issues in our everyday life. Consider parking your car in between 2 trucks. Isn't that a hassle to get out of the car making sure that the door doesn't mark a scratch to the vehicle parked next to you? Well, our model provides an efficient parking spots to each vehicle depending on the vehicle type and also making sure that the vehicle gets the nearest possible parking spot depending on the various dynamic entries and exits of other vehicles. This model considers the parking space which can be represented as a directed tree structure as shown below. Where The entry and exit are IN and OUT nodes respectively and the nodes Ni, Oi, Pi, Qi, Ri and Si are the parking spots where i=1 to n.
  Broader Impact: This project provides an prototype for the parking problem faced in many supermarkets.

- **+*GC-12 Language conversion**
  by Charishma Macherla (MSCS),Jhilakshi Sharma (MSCS)
  Advisor: Dr Xiaohua Xu
  This project is designed to help international and physically disabled students to understand the speech delivered by a professor at a remote place or at the same place. So the way that this project works is, it capture the speech of the professor who is delivering the lecture and converts the speech to English text and transmits to the app at students end. and at the students end, based on the settings that student has configured, the text is converted to their own language and then converted to speech. for the students who has the disability to hear the speech. they can see the converted text and understand what the professor is teaching in real time.
  Merit: one day, there would be no communication barrier between 2 people of different languages. Doctors can understand the pain of a patient, a girl can feel the love of a boy and a student can learn and reach his dream in a easy way.
  Broader Impact: Need more research on machine learning and artificial intelligence to understand how the speech to text and text to speech conversions can happen in real life.

- ***GC-13 When To Buy Airlines Ticket**
  by James Pock (MSIT)
  Advisor: Dr. Lei Li
  The goal of this project is to find the best time to buy an airline ticket. Airline ticket prices vary depending on how soon the flight is. Using attributes of a specific flight, the team will try to predict the optimal date to purchase a

ticket. For instance, it is generally true that the farther in advance you buy a ticket the cheaper it will be. However, this is a very simple heuristic which may not be true. In this project, the team will be in charge with determining the relationship between purchase date and flight cost. Additionally, the team will build a predictive model so that a user can choose a specific flight and be given an optimal date to purchase the ticket.
Merit: If we are able to find the perfect day to buy airline ticket, it will let us know in advance the possible date to purchase airline ticket in cheapest possible fare.
Broader Impact: We are still a work in progress. Hence, we will try every predictive model there is to get the identify the best possible date to purchase ticket.
Learn More

- ***GC-14 Churn Rate Prediction of Business**
  by Michael Wong (MSCS), Vaibhav Pandey (MSCS), Farid Khan (MSCS)
  Advisor: Dr. Mingon Kang
  The success of a company relies on many different factors. One of the most important is understanding and recognizing what works and what doesn't. In the industry and data science, customer churn refers to the occurrence of customers discontinuing service with a business or when subscribers end their subscriptions. The loss of clients or customers is detrimental to company profit and sustainability. Therefore it is crucial for a company to predict and analyze the churn rate. Churn rate analysis contains valuable information such as what deters customers from returning. Our project focuses on churn rate prediction and analysis. Several machine learning classification methods are used to determine how accurately the churn rate of a company can be predicted and analysis of different independent variables allowed us to deduce the reasons for customers leaving. The telecom customer churn dataset containing 7043 samples along with 21 different features from kaggle was used for the experiments. Considering that companies yield massive amounts of data, we simulated a scalable model by using KSU's computer clusters for loading and processing our data with a well-known big data framework called apache spark. Ultimately, our goal is to find the best method for predicting customer churn rate and recommend the most precise methodology.
  Merit: Mitigation of company loss by accurately predicting customer churn rate and reasons for customers dissatisfaction. Essentially, to reduce company loss and increase company profit.
  Broader Impact: Consider scalability from our test model to that of a large company. We will also continue to explore new methods through research to evolve and improve our model as necessary.

- **+*GC-15 Parallelizing Random Lasso**
  by James Hamilton (BSCS),Daniel Karasek (MSCS),Sams Khan (BSCS), Jason Wein(BSCS),Devyn Wilkins (BSCS),Seung Choo (BSCS)
  Advisor: Dr. Mingon Kang
  Random lasso is the state-of-the-art method of regression analysis used on high dimensional genetic datasets for predicting complex gene regulatory networks (GRNs). Random lasso builds upon some of its predecessors, e.g. least squares, ridge regression, and lasso regression. It has long been a challenge in bioinformatics to improve the accuracy and speed of algorithms that predict complex GRNs. Runtime for any meaningful research using random lasso is often hours or days. Parallel programing takes advantage of

multiple cores within a computer to run tasks congruently, but this is only beneficial if these congruently run tasks are completely independent of each other. Random lasso has highly-independent tasking making the prospect of parallel computing attractive. The problems we tackled: (1) identifying areas most susceptible to parallel programing within random lasso, and (2) implement parallel computing in the most algorithmically effective was on the aforementioned susceptible areas. Our methods of parallelizing random lasso focus on the highly independent bootstrapping and sampling processes with random lasso. Random lasso essentially runs lasso many time with a random sample each time. The final result is simply an average of all the previously calculated, through lasso, coefficients. Since lasso is the most computationally burdensome step within each independent bootstrap, we plan to parallelize these lasso bootstraps. A computer with two cores should nearly reduce the runtime in half. We will record and compare our incremental changes to random lasso without spark. Random lasso is particularly beneficial in bioinformatics, but it can be applied to any dataset that meets the following conditions: (1) high dimensionality, and (2) a sample size that is significantly less than the number of features, i.e. q p. We tested plan to test our implementation of random lasso on simulated genetic data provided by Doctor Kim. In this simulated data the samples are patients and the features are genes. The amount of samples and features vary, but max out at 1,000 samples and 100,000 features. Some level of data preprocessing is often required. Data needs to be in matrix form with samples as rows and the features as columns. To reiterate, the amount of features should be significantly larger than the amount of samples, else simpler regression analysis methods will suffice with greater speed. Data should also be normalized with a studentized residual, similar to z score, as opposed to a min-max calling between 0 and 1. A studentized residual avoids a min-max assumption, which suits our needs since the subset of data we are given doesn't necessarily contain the min or max for the whole population.
Merit: There exists no package for regression analysis using random lasso. Random lasso is the state-of-the-art method of regression analysis for multidimensional datasets with comparatively high features and low samples. Due to the algorithmic complexity of Random Lasso, researchers often opt for more juvenile methods of regression analysis that are less accurate, but pre-made in a package. We are releasing a public random lasso package for both R and Python, so that this algorithm becomes a more publicly accessible tool for research. Random lasso runs lasso multiple times on multiple bootstraps of a dataset. Because of this, some researchers may shy away from using random lasso, given its time consuming and computationally burdensome nature. We alleviated some of this deterrent by adding parallel computing using Spark to the highly independent processes of the random lasso algorithm.
Broader Impact: As mentioned before, this algorithm will be publicly accessible on R and Python as a package. On top of this we are building a website that gives users a guide on how to use the package. This website will also show users on how to preprocess data for random lasso, and give general educational material on the random lasso and its predecessors.

- ***GC-16 Determining Warehouse Placement**
  by Chip Gardner (MSCS), Erik Swanson (MSCS), Daniel Brown (MSCS)
  Advisor: Dr. Xiaohua Xu

Proper warehouse placement is essential for any company which depends on shipping goods. Our project uses Dijkstra's algorithm to find which node in a network would be the most central in the network. We utilize a weighted graph to represent a combination of distance and the quantity of goods being ship between locations. This allows for the graph to not be biased toward location which don't receive many goods but are far away. In addition to finding which node is the most central in the graph the program also returns the shortest path between each node and the central node.
Merit: Our program could be utilized by both shipping company's and factory's to determine where machinery and distribution centers should be placed. Effective placement of resources allows for cost mitigation and for products to arrive in the most timely manor.
Broader Impact: Our project could be applied to the proper placement of water towers in rural areas to provide water to as many people as possible. This would be done by capping an maximum weight on shortest path network to allow for enough water at a high enough pressure to service the surrounding people.

- **GC-17 Fake News Detection**
  by Farid Khan (MSCS), Chris Regan (MSCS)
  Advisor: Dr. Xiaohua Xu
  Fake news is an incumbent problem. It effects many aspects of our lives, eg: elections, ill- informed decisions, economics etc. We are working to develop a classifier that can predict fake news or articles with high accuracy. Further we will create a Web API, which will allow users to check whether an article is true or fake in real- time.
  Merit: this effects many companies as user can easily access internet and share news or opinions which are fake or not true with respect to a company. For eg: Users can tweet about Starbucks that it is selling free coffee on certain day. If the tweet is not flagged in real time then it can impact the companies perception and clients loyalty. May create economic difficulty.
  Broader Impact: further test and study on applying the classifier to scan tweets and facebook feeds to check if an article is fake or real. then create a mechanism to alert the administrator if an article is flagged.
- **GC-18 Multi-Factor Auth. Analysis**
  by Matt Giddens (MSIT), Daniel Goodwill (MSIT), Cecilia Long (MSIT), Jesus Salcido(MSIT)
  Advisor: Dr. Lei Li
  A research analysis project of the technology, benefits, disadvantages, and legislation of Multi-Factor Authentication. The project was completed for the Georgia Technology Authority, a state government agency responsible for managing the delivery of IT infrastructure services to state executive branch agencies as well as state and local government entities. Research included the detailed analysis of MFA technologies, regulation requirements of specific industries, case studies, and a sample implementation plan.
  Merit: MFA is an important topic for businesses to understand. Cybersecurity is a topic that is in the national and international spotlight due to attacks on organizations throughout the world that have exposed countless amounts of personal information. Business leaders must be keenly aware that their systems need to properly identify users accessing the system as traditional password systems of the past do not adequately do the job.
  Broader Impact: Since this project was all based on performing research, the team members will take this knowledge and apply it where applicable in our

roles and jobs in the future and help people understand the importance of security.

Graduate Research (15)

*** Candidates for the best project award**
+ Project will be featured during the Flash Session

- **GR-01 Blockchain in real estate**
  by Shashank Hebbar (PhD. in Analytics and Data Science)
  Advisor: Dr. Meng Han
  The blockchain is a decentralized distributed system of records where each user has their own copy of the records. New transactions are added by a consensus mechanism which makes it secure and instantaneous. It is currently widely used in the financial industry but has a wide variety of applications. The blockchain contains a certain and verifiable record of every single transaction ever made. This paper investigates the application of blockchain in the real estate market using Ethereum as a platform.
  Merit: The commercial real estate industry should consider keeping digital identities to keep up with the growing demand for digital transactions. This corresponds to having a unique digital identifier for a given property which would contain information such as vacancy, tenant profile, performance metrics as well as financial and legal status in the digital form. Having this can expedite the due diligence process involving physical documents and property evaluation. This would allow financial institutions to perform activities with increased accuracy and to automate or semi-automate a lot of these processes. Digital identities of people linked with digital identities of properties can be a powerful force.

- ***GR-02 CAncer-Texture Network (CAT-Net)**
  by NELSON Zange TSAKU (MSCS), Sai Kosaraju (MSCS)
  Advisor: Dr. Mingon Kang
  Recently, the importance of histopathological image analysis for cancer classification has been dramatically increased due to the advancements in microscopic imaging techniques that allow digitizing glass slides into Whole Slide Images(WSIs). In this study, we present a novel Cancer Texture-based deep neural network model (CAT-Net). The innovation of CAT-Net is twofold: (1) capturing invariant spatial patterns by dilated convolutional layers and (2) reducing model complexity while improving performance. CAT-Net can also provide distinctive texture patterns formed on cancerous regions of histopathological images comparing to normal regions.
  Merit: We obtained a gastroscopic biopsy specimen of 94 cases at the Gyeongsang National University Changwon Hospital (Changwon, Korea) between February 2016 and July 2017, and the tissue specimens were stained with hematoxylin and eosin (H&E) using standard protocols in routine clinical care. This study included 188 whole slide images (WSIs) with 26, 22, 40, 40 and 60 WSIs for well, moderately and poorly differentiated adenocarcinoma, poorly cohesive carcinoma including signet-ring cell features, and normal gastric mucosa, respectively.
  Broader Impact: Propose the results to digital Pathologists, for consideration

to potential automatic enhancement of their work.
Learn More

- **+*GR-03 Predicting Post Popularity**
  by Shayan Shamskolahi (MSIT), Jennifer Hunter (MSIT)
  Advisor: Dr Ying Xie
  Title: Deep learning approach for predicting popularity of Pinterest posts.
  Adviser: Drs. Ying Xie and Meng Han Pinterest is a widely-used social media platform that revolves around creating virtual bulletin boards and'pinning'photos to those boards. Pinterest users have a feed which is based upon the type of image that the users have re-pinned in the past. Users select photos from their feeds, from other users' boards, from the internet, or from personal photos. They 'pin' the selected photos onto their boards. If a photo is from another Pinterest user, then the photo is re-pinned. Users collect their favorite photos on different boards under categories such as recipes, fun, DIY, and so forth. Research suggests that a number of factors, such as gender, board names, image caption, can impact the popularity of pins on Pinterest. This project attempts to predict the number of re-pins that a given Pinterest post receives and suggest what how to improve popularity of a post by performing deep-learning algorithms on the data gathered through a web crawler. The model will ultimately apply to e-commerce platforms in order to improve the reception of marketing pins and therefore generate more sales.
  Merit: Applying data science to improve targeted marketing posts and to optimize the sales .
  Broader Impact: Applying the findings (the trained and tested machine learning model) to e-commerce platforms. The ultimate goal is to develop a recommender model that optimizes the reception and consumption of marketing posts by suggesting attributes such as caption, classification, photos properties, ...

- **+*GR-04 Log based anomaly detection**
  by Vannel Zeufack (MSCS)
  Advisor: Dr. David Kim
  The project aims at detecting abnormal behavior in networks systems by analyzing log files.
  Merit: This project is a preliminary to improvements in anomaly detection based on the analysis of log files. Indeed, this current implementation is the fruit of the combination of various works. I intend to build on it to build a better (compared to benchmark works), fast, accurate anomaly dectection system to improve the safety of nowadays growing systems.
  Broader Impact: The log analysis system I am proposing works in a batch mode, meaning it cannot scan the logs in real time as they come. I therefore intend to learn real-time analysis techniques and merge them with this work to provide a log analysis tool which can promptly and accurately alert system administrators whenever there is an issue in the system.

- ***GR-05 IntelliTeach**
  by Shwetha Adoni Prasad (MSCS)
  Advisor: Dr. Dan Lo
  This project concentrates on classifying IT Helpdesk tickets using Machine Learning techniques. Various complaints lodged with the helpdesk is categorized based on the problem statement defined by the user. The dataset is trained with our machine learning algorithm to predict the categories of

future incoming customer complaints. We use Natural Language tool kit, clustering and machine learning techniques to achieve our goal.
Merit: There are a lot of unbalanced data set in the real world. This model helps us to understand the ways in which the data can be balanced and also explains the consequences of unbalanced data. As we are working on real world helpdesk data set, We can also understand how and what data to be used to train with ML. It also answers how to classify textual content. We also understand what kind of feature extraction methods suits helpdesk data.
Broader Impact: 1. We can implement and test various multi class classification algorithms to conclude the best among all. 2. Plug and play kind of code where you can simply plug your dataset to get doc2vec feture vectors and results of 3-4 Supervised ML algorithms.

- ***GR-06 Artificial intelligence**
  by zhengwu sun (MSCS)
  Advisor: Dr. Dan Lo
  Try to make the interaction between artificial intelligence and people. such as Siri or Cortana
  Merit: Helps develop and research in the field of artificial intelligence
  Broader Impact: Artificial intelligence will greatly contribute to improving the efficiency of event handling, which is of great help to the public service industry. Can save human resources, reduce waste of resources, and improve the overall efficiency of the service industry

- **+*GR-07 Quaternion based CNN for MRI**
  by Longhua Hu (MSCS), Srivarna Settisara Janney (Phd. Analytics and Data Science), Sumit Chakravarty (Dept of EE)
  Advisor: Dr. Ying Xie
  This project is based on utilizing the Quaternion and Wavelet based new framework of Convolutional Neural Network(CNN) to identify tumor and other diseases anomaly in MRI/CT data to accurately classify. This novel technique is showing promising results than the traditional CNN and current state of art in medical imaging classification field.
  Merit: This project is valuable to doctor and medical professional to accurate diagnose diseases. It acts as an added eye to classify and identify the existing anomaly. This will definitely improve identification and treat the disease which could be missed by human error.
  Broader Impact: We will apply this concept for all kinds of medical images dataset. The success of this project will provide a novel technique framework that could be used for any kind of images. We plan to use this for dynamic medical images such as heart beat data images, video data, which are used for automated medical procedures.

- **+*GR-08 Texture Based OCR extractions**
  by Sai Kosaraju (MSCS), Nelson Tsaku (MSCS), Mohammed Masum (PHD candidate in data science)
  Advisor: Dr. Mingon Kang
  The importance of automatic analysis of Optical Character Recognition (OCR) documents has been increasingly recognized to assist with efficient data managements and accessibility. However, most OCR documents are unstructured, making the analysis extremely challenging. The Document Analysis such as text blocks, and images will provide a layout information.

Moreover, a document's Table Of Contents (TOC) provides an overall structure of a document, such as chapters and appendixes. Hence this work we focus and extracting TOC and document layout information using novel texture based deep learning architectures. Our model follows of identify TOC, separating TOC from the document, Performing Document layout analysis for the remaining document and extracting information for the document, and finally linking with the TOC information. We have developed two deep learning architectures for doing this one (1) RFT classifier for TOC and (2) DoT-NeT for document layout analysis.
Merit: This tool is under deployment in GE Power

- **GR-09 Wifi Fingerprint Technique**
  by Farid Khan (MSCS)
  Advisor: Dr. David Kim
  Indoor localization/ positioning is an open area research. GPS has dominated as the mainstream solution for outdoor tracking (eg: using Google maps to find path to destination) but it can't be applied for indoors tracking. Wifi has been proposed as a solution. It is an attractive solution as it has low maintenance cost, widely available and easy to deploy. The project has three parts: data gathering from multiple access points, develop a machine learning algorithm to train on data and then testing phase (in which the input is RSSI signals and the algorithm predicts the user location). This has broad application as it can be applied in universities, hospitals, parks etc.
  Merit: Assist clients or users to locate easily to there designated destinations. For eg: user wants to find a certain store in a mall. the app can use wifi fingerprint/ signatures to guide him to his destination from his original location.
  Broader Impact: this is an on going research which has broad application. We are concerned first with how accurate wifi fingerprint can be to predict user location. then we can focus on navigation aspect.

- ***GR-10 Big Data Stream on HPCC**
  by Bing Han (MSCS)
  Advisor: Dr. Ying Xie
  Design a novel Data Streaming Neural Network model and implement it based upon the HPCC ESL-ML.NeuralNetwork, with the goal of efficiently performing supervised learning on big data streams.
  Merit: This project is funded by LexisNexis HPCC System.
  Broader Impact: Archive the goal of efficiently performing supervised learning on big data streams.

- ***GR-11 MOEA for Image Segmentation**
  by Wajira Abeysinghe (MSCS), Micheal wong (MSCS)
  Advisor: Dr. Chih-Cheng Hung
  Clustering is an unsupervised learning technique commonly used for image segmentation. As the outcome of most clustering algorithms is heavily dependent on the initial cluster centers, it is necessary to consider optimization during the process of segmentation. The Multi-Objective evolutionary algorithm (MOEA) was used for optimization in this study, to find optimal cluster centers. It is important to note that the effectiveness of MOEA is dependent upon the selection of objective functions. Two objectives were considered; namely, the minimization of intra-cluster compactness and the maximization of inter-cluster separation to determine the optimal initial cluster centers. Xie-Beni index (XBI) was used to measure the compactness

and separation of cluster centers while the Average Inter-Cluster Separation (AIS) measure ensures the minimal overlapping of clusters. The MOEA will generate a set of non-dominated solutions. The Davies-Bouldin Index (DBI) is then employed to determine the most optimal solution for the cluster centers. Experimental results demonstrate that this method of image segmentation performs better than single-objective optimization (SOO)and Possibilistic Clustering Algorithm (PCA).

- **+*GR-12 Traffic Load Balancing**
  by Karl Kevin Tiba Fossoh (MSCS), Ganama Hawaou (BSCS), Gregg Hammer (BSSWE)
  Advisor: Dr. Reza Parizi
  The development of edge computing and the constant increase in data feed make it a must to ensure that the different data provided to central servers are securely processed and transferred within the different smart nodes of the network. The capacity to manage the traffic load of a city is a really important application of smart city architecture as the displacement of goods and people is a basis of economic stability. Engaging smart nodes in a learning process knowing that they access private data, requiring privacy and security, invokes the need to identify the source, transaction, and conditions and establish a consensus between smart nodes and the data centers. This is when the Blockchain intervenes in the communication process in between the smart edges and the data center as a monitor of actions or supervisor of a transaction. The capacity to propose a self-secure evolving smart control grid is a possibility approached in this research document and the eventuality to apply this system to other parts of a smart city control is likely.
  Merit: The implementation of this project on a city-wide aspect could improve the lives of many citizens and increase the overall economic production of the city. A city with efficient communication systems is a city with wonderful productivity. Contrarily to systems that react to congestion use cases, we intend on preventing traffic jams and ensuring that the highway is used to its best capacity.
  Broader Impact: The project's main beneficiaries are the citizens of the city where the system is implemented. More fluid traffic diminishes the time spent on the road and also the overall stress of each and every one. One action we can take is to implement the system first in the Cobb County area, making it easier for students of our dear campus to commute to their favorite school.

- ***GR-13 Fast Clustering with Density Grids**
  by Daniel Brown (MSCS), Arialdis Japa (MSCS)
  Advisor: Dr. Yong Shi
  Work on designing a fast Clustering algorithm using a density-grid in order to improve processing times over traditional Clustering methods.
  Merit: The increased speed of processing means that the large data sets used in the real world can be processed much faster compared to more traditional methods.
  Broader Impact: We are currently continuing work on improving the algorithm to increase speed even more.

- ***GR-14 BlockChain Drug Counterfeit**
  by Sanjoosh Akkineni (PhD in Analytics and Data Science)
  Advisor: Dr. Meng Han

So we start by understanding what exactly is drug counterfeit and what is blockchain technology, then so it's different features and what makes it so secure, it's architecture and we also go through the working mechanism of dBFT blockchain and see how it can be implemented in drug counterfeit and proposed implementation.
Merit: The fighting of fake drugs gets on with a manufacturer adding QR codes(unique identifier), for all the drugs after mass-producing them and the QR code contains information like the drug name, manufactures name and location, timecode or timestamp and the expiration date. This system will help the businesses keep track of their medicines across the globe.
Broader Impact: The blockchain securely hosts and shares data advanced digital ledger of the QR code with the pharma ecosystem and the blockchain trade partners can now share data in a transparent environment, all trade partners validate each transaction, everyone has a unique identifier and controls who can see their information helps offset the financial burdens of regulatory compliance lowers the cost of bringing drugs to market.

- ***GR-15 Data-driven Analytics: A Case Study**
  by Shreya Desai (MSIT)
  Advisor: Dr. Meng Han
  Analysis on the popular data driven environment of all times, Instagram and Google Trends. The analysis is to study the conception and innovation of Education branding over these exceptional applications.
  Merit: Understand the extent of analytical research aspect of social media and Google search results. Help youths make a better selection for college admission through new perspective
  Broader Impact: Encourage the people of the nation to be productive on Internet usage To have a positive outlook when on public platforms Propose a new vision on Education branding

Undergraduate Research (5) −

*** Candidates for the best project award**
+ Project will be featured during the Flash Session

- **+*UR-01 Mask RCNN for laparoscopic surgery**
  by Giovanni Bamou Nana (BSCS), Wesley Ellgass (BSCS), Spencer Feeney (BSCS), Marissa Hudson(BSCS), Tristan Leavitt (BSCS), Justin Spaid (BSCS)
  Advisor: Prof. Pablo Ordonez
  We are using mask rcnn to segment organs used on cholecystectomy laparoscopic surgery
  Merit: Both
  Broader Impact: In the future, this work can be used to make surgery safer.

- **+*UR-02 Draw2Learn**
  byNoah Gardner (BS Computer Engineering),Jiaming Li (BSCS), Hao Zhang (BSCS),Cino Trinh(BSIT)
  Advisor: Dr. Chih-Cheng Hung
  Draw2Learn is an application that will help adolescents learn by drawing. The adolescent will be introduced a word, the adolescents will then draw the word. The application will try to classify the drawing to determine if the word drawn was correct or not.
  Merit: Enhancement of learning and education.

Broader Impact: This application can be further enhanced to teach the user a new language. Voice can be added to this application so that it can say the words in any language.

- ***UR-03 Macro Malware Detection with ML**
  by Ruth Bearden (BSCS)
  Advisor: Dr. Dan Lo
  Microsoft Office macros are scripts stored in Microsoft Office files which have been leveraged as an entry point for ransomware attacks, viruses, and denial of service (DoS) attacks among other types of malicious attacks. The goal of this project is to determine automatically through static macro code analysis whether or not a macro is malicious. To do so, this project uses concepts from the Word2Vec algorithm, originally developed for text classification problems, to get a context-aware image from the terms in a macro and uses this data to build a neural network for classification.
  Merit: Malicious macros are primarily used as an attack vectors and rarely contain the actual malicious payload, so they are rarely addressed in research. However, many malware detection methods applied to executable files and other common forms of malware are easily applied to macros. We believe the biggest intellectual contribution of this project is the exploration of applying the Word2Vec feature engineering technique to malware classification problems.
  Broader Impact: We will be further exploring the use of Word2Vec not just with macro malware but with other forms of malware as well. Word2Vec has proven extremely effective in text classification and we hope it can also be leveraged to have a similar impact on the malware detection industry.
  Learn More

- ***UR-04 Two algorithm comparison**
  by Hao Zhang (BSCS)
  Advisor: Dr. Kai Qian
  Machine learning is widely used in fields such as spam recognition, face recognition, speech recognition. Classification is one of the most important techniques in machine learning. In classification problems, logistic regression and decision tree are two efficient algorithms in supervised learning. In my research, we tested logical regression and CART decision tree algorithms on different datasets. The results showed that the CART decision tree performs much better in data set with more attributes and slight imbalanced data distribution. At the same time, logistic regression is more accurate on datasets with fewer attributes and balanced data distribution.
  Merit: Because the purpose of this project is to select different algorithms for different data sets, this project can be used in any field of machine learning. For example, it can help the company to identify potential customers, and also help the bank to determine the user's credit balance
  Broader Impact: Try to help some companies to apply the algorithm, take advantage of machine learning to help some companies to create more profits.

- **+*UR-05 Mask RCNN for laparoscopic surgery**
  by Eric Schneider (BSCS), Jay Clark (BSCS), Leontios Haralambus (BSCS), Justinas Songaila(BSCS), Wade Whitten (BSCS), Oliver Prestridge (BSCS)
  Advisor: Prof. Pablo Ordonez

We are using mask rcnn to segment instruments used on cholecystectomy laparoscopic surgery.
Merit: Both
Broader Impact: In the future, this work can be used to make surgery safer.