



ADVANCING INFORMATICS IN GOVERNMENT AND INDUSTRY

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Poster Abstracts

A Multi-Cloud Cyber Infrastructure for Monitoring Global Proliferation of Cyanobacterial Harmful Algal Blooms

Presented by: Abhishek Kumar

Authors: *Deepak Mishra, Lakshmish Ramaswamy, Abhishek Kumar, Suchendra Bhandarkar, Vinay Kumar, University of Georgia, Sunil Narumalani, University of Nebraska*

Cyanobacterial Harmful Algal Blooms (CyanoHABs) are a major water quality and public health issue in inland waters as they hamper recreational activities, degrade aquatic habitats, and potentially affect human health via toxic contamination. Despite the risks posed to environment, human and animal health, currently, there is lack of rapid monitoring program to periodically evaluate the spatial distribution of cyanobacteria in inland waters. This study integrated multiple clouds including community cloud (via social media data), sensor cloud (wireless hyperspectral sensor and satellite sensor) and computational cloud to design and implement techniques for early detection of CyanoHABs in inland waters. Social cloud data helped to identify the geographical locations frequently affected by CyanoHABs and sensor clouds helped in verifying those locations. This integrated monitoring system would be very useful for lake resource managements and state agencies by reducing their budget cost for rapid detection and frequent monitoring of CyanoHABs across inland waters.

SCOUTS: Smart Community Urban Thermal Sensing framework

Presented by: Navid Hashemi Tonekaboni

Authors: *Navid Hashemi Tonekaboni, Yanzhe Yin, Lakshmish Ramaswamy, Andrew Grundstein, Deepak Mishra, University of Georgia*

Due to the rapid growth of buildings, depletion of green cover, and climate change, extreme heat events are posing an increasing threat to many urban communities around the world. To date, urban heat vulnerability research has mostly focused on generating coarse-grained heat maps of cities using satellite images with low spatio-temporal resolutions to quantify the heat hazard. While some recent works propose incorporating data from nearby static weather stations as the reference, because of the limited availability of weather stations, it fails to reflect the spatial variations of air temperature in urban areas. In this paper, we present our vision for a crowdsensing approach to tracking the actual heat experienced by individuals and communities with very high spatio-temporal resolution. The proposed framework, Smart Community-centric Urban Thermal Sensing (SCOUTS), seamlessly support a variety of human, vehicle, and drone-borne sensors in conjunction with satellite and weather station data to accurately map the heat hazards of urban regions and communities.

More idioms than you can shake a stick at

Presented by: Kyle Vanderniet

Authors: *Kyle Vanderniet, University of Georgia*

Text corpora are frequently used by many linguistic disciplines to study language from lexical choices to syntactic constructions. Corpora provide an easily accessible, statistically powerful tool for little or no cost. However, because they are comprised of mostly written sources, they excellent for studying written language, but presents a problem when exploring natural, authentic speech. As an alternative resource for exploring informal language this paper compares text corpora against a computer moderated communication (cmc) platform; Reddit. This cmc platform provides a tremendous volume of linguistic data surpassing all but the largest text corpora while also drawing from millions of unique contributors who offer spontaneous, synchronous, utterances (Baumgartner, n.d.; Nishimura, 2009; Woo, 2018). The intent for this paper was to determine how a cmc, like Reddit, compared to a text corpus in

evaluating how informal spoken language is used. The Corpus of Contemporary American English (COCA) was used as the text corpus in this case because it is updated by 20 million words a year in a balanced approach. Reddit was the cmc of choice because its structure made it much easier to work with than other popular cmc like twitter and Facebook. The number of uses for each of two idioms were counted as well as the number of variations for each idiom. Reddit had more than 10 times the tokens and more than double the variations of the idioms per million words, showing Reddit to be more representative of informal speech than COCA.

A Group Comparison in FMRI Data Using a Semiparametric Model Under Shape Invariance

Presented by: Arunava Samaddar

Authors: *Arunava Samaddar, Christopher J. Helms, Cheolwoo Park, Nicole A. Lazar, Jennifer E. McDowell, Brooke Jackson, University of Georgia*

The objective of this work is to compare differences of groups of subjects in brain activation changes across two sessions associated with practice-related cognitive control in multiple regions of interest of the brain. In functional magnetic resonance imaging (fMRI) data analysis, it is often challenging to directly compare brain signals from different groups of subjects due to low signal-to-noise ratio in fMRI data. Using the property that brain signals in regions of interest may contain a similar pattern across subjects in a task-related experiment, we develop a semiparametric approach under shape invariance to quantify and test the differences in sessions and practice groups. We estimate the commonly shared function using local polynomial regression, and estimate shape invariant model parameters using evolutionary optimization methods. We apply hypothesis testing procedures on the scale parameter to determine whether the practice effect is present for different practice groups and whether a difference exists among groups before and after the practice in multiple regions of interest. It is shown that the brain signal shows attenuation at the post-practice session for the task-related practice group only and also shows the difference among the practice groups in some of the regions tested.

ODIN: Tracing Ideas, Entities, and Relationships from Big Textual Data

Presented by: Saber Soleymani

Authors: *Hani Safadi (MIS), Richard Watson, Usha Rodrigues, Saber Soleymani, University of Georgia*

We propose to develop an online platform to make transparent disparate open data about US lawmaking. The platform will integrate various sources of information including legal documents, lobbying activities, and public records of meetings and speeches to allow citizens and journalists to clearly see stakeholders and relationships that influence legislation and regulation at various levels of granularity

Design Recommendations from a Tele-Exercise Feasibility Study

Presented by: Taylor Mackin

Authors: *Taylor Mackin, George Mois, Jenay Beer, University of Georgia, Lyndsie Koon, Wendy Rogers, University of Illinois Urbana-Champaign, Tracy Mitzner, Georgia Institute of Technology*

Tele-exercise is the use of video conferencing technology to administer and participate in exercise classes. These interventions have been growing in popularity and may be beneficial for a number of populations including persons aging with impairment/disability. However, for at-home tele-exercise interventions to be successful, careful consideration is needed on the design and implementation requirements. This study focused on the feasibility of a developing a tele-exercise Tai-Chi intervention. For this feasibility study, participants (N = 11) aged 40+ and who identified as having a mobility impairment for at least five years, participated in a web-based video conferencing (OneClick.chat) seated, one-on-one, gentle movement exercise demo. Data from observations, tele-exercise demonstrations, questionnaires, and semi-structured qualitative interviews were collected to assess user perceptions and requirements for implementing the tele-exercise. Design recommendations include improving audio/video quality, increasing screen size, providing instructional support, and employing strategies for collecting performance data from users who participate in these programs.

Statistical Inference for Rossby Waves: A Time Series Approach to Persistent Homology

Presented by: Richard Ross

Authors: *Richard Ross, Nicole Lazar, Lynne Seymour, Thomas Mote, University of Georgia affiliated*

Persistent Homology is a tool used within the framework of Topological Data Analysis that helps to summarize data based on its homological structure. We employ a new method called the sequential morse filtration to generate

time series which describe the relative strength of evidence for certain climatological patterns (a given number of Rossby waves). In this work, we implement inference for dependent time series data to provide concrete statistical inference. We present the results of this time series analysis, present a possible interface for climate researchers to use our work and results, and describe the next steps in developing our models and inference.

Designing Breathe Easier: A Mindfulness mhealth Intervention for Lung Cancer Survivors and Family Members

Presented by: Taylor Kennedy

Authors: *Taylor Kennedy, Kasey Smith, Dane Acena, George Mois, Jenay M Beer, David Gallerani, Otis LaShaun Owens, Karen Kane McDonnell, University of Georgia*

Although survival rate for individuals with lung cancer is increasing, symptom burden remains a public health concern. Survivors (typically aged 55+) have difficulty managing symptoms, such as, dyspnea, fatigue and long-term stress. Furthermore, transportation is an issue for some survivors and caregivers; therefore, being able to access information, behavior-changing interventions, and social connection to others from home is important. To this end, our goal is to develop a mobile app that delivers an evidence-based mindfulness intervention to lung cancer survivors and caregivers. METHODS: This research is comprised of three phases: Phase I was the development of an 8-week in-person group intervention known as Breathe Easier. Phase II is the adaption of this intervention into a mobile application utilizing user-centered design. Phase III is comprised of community-based participatory focus group evaluation. RESULTS: The Breathe Easier app prototype will demonstrate design choices supported with an extensive literature review. Focus groups (N=19), with both survivors of lung cancer and family members. were conducted in April 2018. Preliminary findings show a need for community connection via app. Participants reported convenience and accessibility as possible benefits, and stated cost and complexity as possible concerns. Data analysis is underway and will be available for presentation in October. DISCUSSION: Converting in-person interventions into mobile platforms increases access to and distribution of important public health information and programming. Design recommendations from this project should be applied to similar populations to improve usability and acceptance of technology for health information.

3D rootphenotyping for improved carbon sequestration

Presented by: Suxing Liu

Authors: *Suxing Liu, Alexander Bucksch, University of Georgia*

Problem: Modern life depletes too much carbon by extracting oil and coal from soils. As a consequence, we emit CO₂ into the atmosphere. Low carbon content in soils lead to decreased agricultural productivity.

Situation: The US planted 91 Million acre of corn in 2017 that assimilate ~ 815 Million Metric tons of CO₂. It is estimated that soil carbon content can be increased by ~1 Gt per year with deeper rooting maize varieties because plants can sequester carbon back into soil. The sequestration into the soil relies on the uptake of atmospheric CO₂ by the shoot and the release of carbon through the root.

Challenge : Root traits linked to deeper rooting such as whorl number, distance and number of roots per whorl are hidden inside the root architecture[1,2]. However, automated high-throughput phenotyping of these traits is needed to identify genes controlling deeper rooting and therefore the release of CO₂ into deeper soil levels.

Selecting Selecting a Representative subsample via SDART

Presented by: Cheng Meng

Authors: *Cheng Meng, Jingyi Zhang, Jinyang Che, Wenxuan Zhong, Ping M, University of Georgia*

We present a novel approach for selecting a "representative" subsample, a subsample that can well-represent the population distribution, from a given large-scale sample. We propose a subsampling method called "SDART", which selects such a representative subsample, without using any prior information of the population distribution. By utilizing the techniques of space-filling design and iterative optimal transport map approximation, the computational cost for SDART is approximately linear to the sample size. For the quantitative methods/models with large computational cost, the proposed SDART method can be used to accelerate the calculation without losing too much accuracy. As one application, we show how SDART can be used for efficient density estimation, through both theoretical and simulation results. We also show SDART is favorable for active learning, where the selected subsample is used to train a classification model. The experimental results on a wide variety of real-world datasets show that the proposed SDART method outperforms several state-of-the-art active learning approaches.

Mapping a technology ecosystem to advance the quality of life for older adults

Presented by: George Mois

Authors: *George Mois, Tiffany Washington, University of Georgia*

Background and Purpose: Many of the challenges that may affect older adults' quality of life can be addressed with the adoption of an assistive technologies ecosystem. Quality of life is frequently characterized by purposiveness, self-confidence, and continued engagement to improve health behavior patterns. An assistive technology ecosystem refers to the use of multiple assistive technologies to address a set of challenges affecting single or multiple characteristics of older adults' quality of life. Current literature lacks insight pertaining to how the adoption of a technology ecosystem impacts quality of life. The objective of this study is to investigate how the use of technologies can influence older adults' quality of life. **Methods:** The data used for this study was collected by the 2016 wave of the National Health and Aging Trends Study (NHATS). A random sample of the Medicare enrollment database through random selection of zip-code clusters across the contiguous United States was selected by the NHATS. The sample includes older adults age 65+ (N=5,488). The dependent variables describing quality of life are: self-confidence, continue improving life, likes living arrangement, and self-determination. These variables were dichotomized. The variables used to measure technology use are: owns and uses a computer, owns and uses a cell phone, owns and uses a tablet, and internet use. Prior to proceeding with the full model, the data were examined for sample size, outliers, ratio of cases to variables, independence of observations and multicollinearity, using univariate and bivariate analysis across all variables. The data from these variables was analyzed using four logistic regression models to answer the address the study objective. **Results:** Participants were mostly female, predominantly white, aged 70-74, and aging in place. Results indicate that older adults using the internet had higher odds of self-determination (OR= 1.638, 95%CI=1.387-1.933 p= .001), like living arrangement (OR= 1.974, 95%CI=1.277-3.051, p= .002), and continue improving life (OR= 1.786, 95%CI=1.508-2.116, p= .001). Older adults using a tablet had higher odds of continuing to improve their life (OR= 1.249, 95%CI=1.079-1.445, p= .003) and increased self-determination (OR= 1.174, 95%CI=1.017-1.355, p= .028). Older adults owning and using a cellphone had higher odds of having self-confidence (OR= 2.814, 95%CI=1.301-6.085, p= .009). **Conclusions and Implications:** The findings indicate that the use of assistive technologies (e.g., tablets, internet, and cellphones may impact older adults' overall quality of life) may improve the quality of life experienced by older adults, but the type of technology used varied across quality of life characteristic. These findings support the need of a technology ecosystem to improve the specific characteristics and overall quality of life and address challenges faced by older adults. Findings can contribute to the development of assistive technology educational programs for older adults wanting to age in place. Additionally, data collection in the area of technology use amongst older adults can inform interventions to improve access to assistive technologies.

Toward Simple and Scalable 3D Cell Tracking

Presented by: Mojtaba S.Fazli

Authors: *Mojtaba S.Fazli, Stephen A. Vella, Silvia N.J.Moreno, Gary E. Ward, Shannon Quinn, University of Georgia*

Toxoplasma gondii is an obligate intracellular parasitic that is the causative agent of disseminated toxoplasmosis. Roughly, one third of the world's population will test positive for *T. gondii*. Its virulence is linked to its lytic cycle and is predicated on its motility and ability to enter and exit nucleated cells; therefore, studies elucidating its mechanism of motility and in particular, its motility patterns in the context of its lytic cycle, are critical to the eventual development of therapeutic strategies. Here, we present an end-to-end computational pipeline for detection and tracking of *T. gondii* cells in 3D microscopic videos. Our pipeline consists of 4 different modules including: Preprocessing, Sparsification, Cell Detection, and Cell Tracking. Then we recognized the bottlenecks in our pipeline, and finally, we developed a parallel version of our code and compared the performances of both serial and parallel versions of our pipeline. Our results indicate that the parallel version of our pipeline performs remarkably faster than the serial one.

Fully Convolutional Networks for Blueberry Bruising and Calyx Segmentation using Hyperspectral Transmittance Imaging

Presented by: Mengyun Zhang

Authors: *Mengyun Zhang, Univeristy of Georgia and Northwest A&F University, Yangling, Chinga; Changying Li, University of Georgia*

Deep learning methods recently gained much attention in computer vision research due to their superior performance in image classification and object detection. Blueberry internal bruising detection is a significant challenge for the blueberry industry, especially for early bruising detection using noninvasive methods. A total of 600 hand-harvested blueberries were inspected. A near-infrared hyperspectral imaging system was used to acquire transmittance images from 970 to 1400 nm with 5 nm bandwidth. Images were acquired from two orientations (calyx-up, stem-up) for each fruit. Random forest and linear discriminant analysis were applied to the spectra to select three key wavelengths to generate 3-channel input images. A total of 1,200 hyperspectral images were evenly and randomly divided to form training and testing sets. Each image was annotated ground truth with manually labeled. Standard fully convolutional networks (FCN-8s) with VGG-16 NET was utilized to train the 600 images. The average intersection over union accuracy was 81.2% for predicting bruised, non-bruised, and calyx end tissues for 600 testing images. The result indicates that blueberry bruising and calyx end can be segmented from blueberry fruit using deep learning method. It will help quantify blueberry bruising more accurately in the future work.

A Group Comparison in fMRI Data Using a Semiparametric Model Under Shape Invariance

Presented by: Arunava Samaddar

Authors: *Arunava Samaddar, Cheolwoo Park, Nicole Lazar, Christopher J. Helms, Jennifer E. McDowell Brooke Jackson, Univeristy of Georgia*

The objective of this work is to compare differences of groups of subjects in brain activation changes across two sessions associated with practice-related cognitive control in multiple regions of interest of the brain. In functional magnetic resonance imaging (fMRI) data analysis, it is often challenging to directly compare brain signals from different groups of subjects due to low signal-to-noise ratio in fMRI data. Using the property that brain signals in regions of interest may contain a similar pattern across subjects in a task-related experiment, we develop a semiparametric approach under shape invariance to quantify and test the differences in sessions and practice groups. We estimate the commonly shared function using local polynomial regression, and estimate shape invariant model parameters using evolutionary optimization methods. We apply hypothesis testing procedures on the scale parameter to determine whether the practice effect is present for different practice groups and whether a difference exists among groups before and after the practice in multiple regions of interest. It is shown that the brain signal shows attenuation at the post-practice session for the task-related practice group only and also shows the difference among the practice groups in some of the regions tested.

Glyfinder: A tool to query and remediate carbohydrate structures in the Protein Data Bank

Presented by: David Montgomery

Authors: *David Montgomery, Robert Woods, University of Georgia*

With over 150,000 entries, the worldwide protein data bank (PDB) is the primary repository for 3D molecular structure. As the name implies, the PDB was created for proteins, and has rigorous acceptance criteria for the protein structures it accepts. However, carbohydrate structural, annotational, and ambiguity errors exist throughout the database. Our group has partnered with the PDB to assist in the identification and remediation of carbohydrate structures. We have developed GlyFinder, a tool that searches through the PDB entries for sugars based on their structure, not their annotation, and reports errors in naming, missing atoms, and incorrect structures. All of the information is stored in a RDF triple database, which can be queried via a user friendly web interface available at dev.glycam.org/gf. Over 100,000 sugars have been added to our database, from 29,668 of the PDB entries (20.9%). Of these sugars, nearly 10% had errors. The final aim of this study is to gather statistics about all of the carbohydrate structures in the PDB, and develop a gly-probity report (similar to mol-probity reports for proteins). This project is still in progress, and we are meeting with the PDB over Thanksgiving break to discuss software integration between the groups and to begin sugar remediation.

Intelligent Power Electronics and Electric Machines

Presented by: Kun Hu

Authors: *Kun Hu, Bowen Yang, Jin Ye, University of Georgia*

This poster contains two parts of our research in the intelligent power electronics and electric machines laboratory. One is Mutually Coupled Switched Reluctance Machines, which focus on design and control of the MCSR and its torque ripple and copper loss minimization. The other one is Condition Monitoring and Fault Diagnosis of Generators in Power Networks, which is a branch of our research about motor network and focus on using advanced signal processing methods to identify and locate generator faults with limit strategically located waveform sensors in the power networks.

Smart Connected Systems for Health and Energy

Presented by: Jose Clemente

Authors: *Jose Clemente, Fangyu Li, Maria Valero, Yang Shi, Zhiwei Luo, WenZhan Song, University of Georgia*

The purpose of this research is to connect Data, People and Systems in a variety of areas of value to health and energy, such as networking, pervasive computing, advanced analytics, sensor integration, privacy and security, modeling of socio-behavioral and cognitive processes and system and process modeling. Effective solutions must satisfy a multitude of constraints arising from clinical/medical needs, barriers to change, heterogeneity of data, semantic mismatch and limitations of current cyber-physical systems and an aging population.

Machine Learning for Solar Radiation Prediction

Presented by: Zach Jones

Authors: *Chris Barrick, Zach Jones, Aashish Yadavally, Frederick Maier, Khaled Rasheed, University of Georgia*

Solar power is one of the fastest-growing and most promising sources of renewable energy. The output of a solar farm is heavily dependent on the angle and intensity of the sunlight that strikes the panel, which is in turn affected by existing environmental conditions. In this work, we train and compare a variety of machine learning models which attempt to predict observed solar radiation in a 24-hour future window given a current weather forecast. Our findings indicate that tree-based ensemble models are among the best machine learning methods for predicting solar radiation.

Hierarchical Human Activity Recognition (HAR)

Presented by: Shubha Mishra

Authors: *Shubha Mishra, Adithya Raam Sankar, Khaled M Rasheed, Frederick W. Maier, Jennifer L. Gay, University of Georgia*

Sensor devices, such as accelerometers, play a vital role in identifying the calorific expenditure patterns of users based on the variety of activities such as sitting, standing, walking, jogging, climbing stairs, moving uphill or downhill, etc. that they perform every day. The primary objective of this work is to maximize human activity recognition while minimizing the resource requirements. The experimental data was collected for 20 subjects wearing a single hip-worn triaxial accelerometer, performing nine different non-ambulatory and ambulatory activities in a semi-controlled environment for about 20 to 30 minutes. The ambulatory activity set was considerably larger than the non-ambulatory set. Feature extraction was performed on raw data to generate various time-based features. A three-level hierarchical classification-based approach is then used to classify group and individual activities.

Ligand Docking for Drug Design

Presented by: Lei Lou

Authors: *Lei Lou, Lauren Wilson, Paul Zhong-ru Xie*

The ligand docking is a computational method which we use to achieve different goals. Here we used it as a tool to identify specific interactions between drug candidates and protein complex. This project started with the medical research about a drug candidate, LG1980, which is designed to cure lung cancer. However, it did have some significant restrictions such as bad IC 50 and EC50. Besides, we had little idea about how this drug treat cancer cells.

A Pilot Study of Automatic Drug Discovery

Presented by: Yifei Wu

Authors: *Yifei Wu, Paul Zhong-ru Xie, University of Georgia*

Discovering a new drug is an urgent but time-consuming process. The application of in silico approaches could not only speed up the new drug discovery, but also collect important information. However, in most cases, in silico approaches played aided roles in the process. In this study, we propose an all-computational protocol integrating in silico approaches to simulate the entire drug discovery process from de novo protein structure prediction to drug-protein interaction disclosure.

Human small conductance calcium-activated (SK2) ion channels, consisted of SK2 subunits and calmodulin molecules, are therapeutic targets for treatment of neuronal diseases, such as Parkinson's and amyotrophic lateral sclerosis (ALS). We applied this protocol to simulate the current research on SK2 drug discovery and found it had well reproduced the results generated by bench experiments.

The effects of host and environment on the maize microbiome

Presented by: Jason G. Wallace

Authors: *Jason G. Wallace, University of Georgia. Karl A. Kremling, Edward S. Buckler, Cornell University, Ruth E. Ley, Tony Walters, Max Planck Institute for Developmental Biology, Nicholas K. Lepak - United States Department of Agriculture*

Every maize plant has billions of microscopic organisms living in, on, and around it. These microbial communities—collectively called a “microbiome”—have great potential to influence plant growth, but the extent of their influence and the degree to which the host plant shapes them is unknown. We address the question of how much influence the host and the environment have on microbiomes by looking at bacteria in the maize rhizosphere (roots) and phyllosphere (leaves). These two communities show very different makeups: the rhizosphere is highly complex, while the phyllosphere is dominated by <20 bacterial taxa. Environment is the largest driver of the rhizosphere community; host genetics has little direct effect but does show strong gene-by-environment interaction. Broad- and narrow-sense heritability analyses in both communities show that a subset of microbes are moderately affected by host genetics (heritability of 0.3-0.6), while the majority show little effect of the maize genotype. We also identify several metabolic pathways in the phyllosphere that may be shaped by host genetics. Taken together, these results indicate that the maize host exerts only partial control over the makeup of its rhizosphere and phyllosphere communities, and in many cases the environment and/or stochastic chance play a larger role. In addition, the metabolic capacity of these communities may be more important than their taxonomic identity. More work needs to be done to determine to what extent these communities affect their host plant, and to determine if and how manipulating them can benefit agriculture.

3D Cotton Boll Mapping in the Field

Presented by: Shangpeng Sun

Authors: *Shangpeng Sun, Changying Li, Andrew Paterson, Sciences; Yu Jiang, Jon S. Robertson, University of Georgia*

This study presented a multi-view imaging system with consumer-graded digital cameras to acquire images and reconstruct 3D model based on structure from motion principle in the field. A 3D point cloud data processing pipeline was proposed following three steps. First, the ground plane was removed using the RANSAC algorithm; then, a support vector machine based model was trained using color and shape features for cotton boll segmentation from plants. At last, a 3D DBSCAN based method was developed to detect individual bolls from the segmented boll voxels. Experiments with cotton plots showed that good quality 3D model can be reconstructed and the proposed 3D boll mapping methods achieved an accuracy of around 90%, and the squared Pearson correlation was 0.95 between the sensor measurement and the ground truth. The system not only successfully estimated the total number of cotton bolls, but also provided location information for each individual bolls. This was a significant contribution compared to 2D image based methods. The 3D boll mapping information was useful for monitoring crop growth and yield prediction.

Vision-based Hull Measurements for Automated Peanut Maturity Estimation

Presented by: Farid GharehMohammadi

Authors: *Farid GharehMohammadi, Brian Boland, Zhuo Zhao, Kyle Johnsen, Zion Tse, Don Leo, University of Georgia*

Peanuts are one of the most widely grown crops in the world, but are also the most valuable crop in Georgia. As such, it is critically important for Georgia to optimize its process. In particular, a challenge is to optimize the time of harvest. Peanuts are buried and at different levels of maturity within each plant, plant to plant, and location to location. To determine maturity, county agents use the hull scrape method. In hull scrape, a sample of plants is extracted, and then the outer hull of the peanut is scraped off with a pressure washer, revealing the color of the inner hull, which turns from white to black as the peanut matures. However, because the maturity varies considerably, the result is a distribution of peanuts, which is currently determined by a manual process using a color board. Our work aims to optimize this process, and this poster describes a critical innovation: to eliminate hand-sorting through a computer vision process that automatically locates the boundary of each peanut.

CyberArch - Interactive Cybersecurity Education

Presented by: Kevin Warrick

Authors: *CyberArch Team*

How do you provide approachable, practical cybersecurity and privacy education to local businesses, civic leaders, and your greater community? The CyberArch initiative is connecting Georgia communities with the resources and expertise at the University of Georgia, and a recurring desire for common-sense education has inspired an interactive manual on topics in cybersecurity and privacy. We present our methodology for designing a curriculum that integrates a widely popular style of challenge-based cybersecurity competition into community outreach and education.

Eye-tracking as a Research Tool in the Social Sciences

Presented by: Tonyka L. McKinney

Authors: *Tonyka L. McKinney, Dale E. Green*

Eye-tracking technology has traditionally been used in research on the visual system, in psychology, on human-computer interaction, in product design and marketing. Eye-tracking could prove to be a powerful research tool in the social sciences as well. In our study, we seek to use eye-tracking to assess how the design of public health poster presentations impact comprehension and cognitive burden. Previous study literature provides extensive insight into how eye-tracking can be indicative of how easy or difficult information is to process. In those studies, patients exhibit greater pupil dilation during difficult searches suggesting that they expend more attentional resources on searches that place a higher demand on visual processing. The results of our study will indicate that it is imperative that social scientists present and design informational resources in ways that decrease cognitive burden and increase the likelihood of comprehension for consumers of that information.