Summer Research Institute

Brendan Bogar

"Investigating a Framework for Visualizing Reinforcement Learning Algorithms via Quadrupedal Robotic Simulation"

ABSTRACT: Developing ways to make autonomous systems able to adapt to environmental change in the service of a long-term goal has become an important challenge in improving human-robot interaction beyond what is achievable by static system behavior. Visualizing these generated gaits within the confines of a single physics simulation can provide an intuitive method of qualitative comparison and can provide simulated data for precursory quantitative analysis. By proving the feasibility of generating multiple iterations of a robotic model with individual controls reconciled with machine learning inputs/sensing, my research seeks to provide a framework for investigating machine learning end behaviors in a qualitative and quantitative manner. Using ROS middleware, OpenAI Gym algorithms, and Gazebo physics engine, the obtained results provide a framework for refinement and customization that can be further implemented in research and product development.

Rochelle Ranger

“Fostering a relationship between the Gila River Indian Community and the University of Arizona: an analysis of agricultural establishments and socioeconomic impacts ”

ABSTRACT: This paper analyzes data on agricultural and resource economics to consider the socioeconomic factors that affect to the Gila River Indian Community (G.R.I.C.). I begin by providing a literature review that focuses on the western region of the United States (U.S.) and south-central Arizona where the G.R.I.C. is located. Key terms included in the literature used are: tribal water settlements, virtual water, climate change, irrigation methods, and American Indian/Alaskan Native populations. Second, I analyze public data about the G.R.I.C. from the 2012-2016 American Community Survey, 2012 U.S. American Indian Census of Agriculture, and the University of Arizona library databases. In examining the sources, questions and some interpreted images using the 2012-2016 American Community Survey for a fact sheet have been used to begin understanding the demographics of the community. Overall, I use a stakeholder perspective as a G.R.I.C. member to initiate research targeted toward providing results, methods, and models to AI/AN people in agriculture for quick referencing at all educational stages in formats that may withstand the elements of nature.

Tasha Nez

“Using soil DNA biomass quantification to analyze soil variability at the ASARCO Mission mine”

ABSTRACT: Mine tailings are waste materials generated from the extraction, crushing and milling processes of mining. In semiarid environments, uncovered mine tailings can be exposed to local dust transport systems, possibly impacting neighboring communities and environmental health. This is why many companies seek to establish a self-sustaining vegetative cap that can stabilize the mine tailings. In order to understand plant growth and how it can stabilize mine waste, we aim to develop microbial metrics that correlate with plant growth, specifically evaluating the importance of below ground DNA biomass. DNA biomass is a measurement of bacterial, fungal and archaeal DNA in the soil. In the past, DNA biomass variability has been found to be an issue. This project assess the variability range of soil biomass quantification in ASARCO Mission tailings by two different technicians. In the study, soil DNA extractions were conducted using a FastDNA extraction kit for 2016 and 2017. Samples were extracted in triplicates, to assess replicate variability, with a total of 36 sample extractions (n = 36). DNA extractions were quantified using a Qubit fluorometer and analyzed for percent variation, standard deviation and confidence intervals. The results indicate that in 2016, the technicians indeed had replicate variability, while in 2017, the technician’s results were statistically the same. This suggests that the heterogeneous system of soil may be influencing DNA extractions protocols, and for more accurate future results, technician’s may want to do triplicate extractions.

Tyra Protho

“Health Disparities Among American Indians and Alaska Natives Individuals Living in Urban Areas ”

ABSTRACT: Most studies have focused on the health of American Indians and Alaska Natives (AIANs) residing on reservations. There are few studies on the health disparities of AIANs living in urban areas. There is a need for this research because 71% of AIANs reside in urban areas. The current project involved the implementation of a community health needs assessment for Tucson Indian Center (TIC). The purpose of the needs assessment is to identify the physical and mental health needs of AIANs living in Tucson and obtain input to improve and expand TIC services and programs that promote health and wellness of children, youth, adults, and elders. Major activities completed for this project included key informant interviews with tribal chairman and health directors and focus group interviews with AIAN elders, women, and men. In addition, extensive work was dedicated to the development of a health survey that will be administered to 200 AIAN adults at a future community health event. Future activities will include additional key informant interviews, a focus group with AIAN youth, analysis of qualitative and quantitative data, and writing of a final report. The findings from the needs assessment will be used by TIC for grant writing, program development, and establishment of stronger community partnerships to reduce health disparities among AIAN adults living in Tucson.

Margarita Ruedas

“The relations between Latina/o youths’ language hassles and their math and science career commitment ”

ABSTRACT: Latina/os are experiencing challenges in all academic levels. In order to identify potential factors contributing to career choice and commitment among Latina/os, this study used data from the ALCANCE project at Texas State University to examine the relation between acculturative stress and math and science career commitment. The study defines acculturative stress (e.g., language hassles) as stress that forms when two cultures are combined. In particular, the study focused on languages hassles, negative daily occurrences with language, as a form of acculturative stress. The population for this study was N = 329 Latina/o youth; 45.9% girls and 39.5% boys, 14.6% students with unreported gender, and the average age was 13.69. The purpose of this study is to examine the relations between language hassles and math and science career commitment. Further implications of the research are to (1) intervene in the academic achievement gap among Latina/o students, (2) influence policy at state and local levels, and (3) encourage critical engagement among educators and scholars regarding cultural factors when working with students of color. Contrary to our study hypotheses, the findings of this study showed there was no significant relations between language hassles and math or science commitment. In this study, language hassles might not have been salient for a number of reasons. (1) This study was not part of a longitudinal study which could make tracking language hassles difficult, (2) the population was younger adolescents (middle school) compared to most acculturative stress studies done in older adolescents (high school and college).

Elizabeth Torres

"Perceived Differences in Cultural Competency Between Healthcare Providers and Latino Patients"

ABSTRACT: This preliminary explorative qualitative study, informed by grounded theory (Glaser & Strauss, 1967) examined physician awareness of cultural competency as it relates to healthcare vs. patients' Cultural perception for the Latino community within Pima County. Individual interviews were conducted with open ended questions which included personal background and cultural competency. Overall, the patients expressed concern and lack of trust in providers. While provider perception showed unawareness of the impact of cultural competency within patient care. However, some expressed positive response to increased extensive cultural sensitivity training to provide better quality care. Further interviews and implemented case studies could support improved physician-patient relationships, cultural competency, and healthcare outcomes.

Mauricio Serna

“Benefits of Reflective Ruminative Thoughts on Goal Attainment ”

ABSTRACT: Increase the knowledge on the potential benefits of ruminative thinking. Although rumination is often conceived as negative, the present study aims to find benefits for the trait reflective rumination in the attainment of goals. Moreover the study (1) evaluated reflective rumination and purpose in life, (2) explored reflective rumination, specificity of thoughts and goal oriented thoughts, and (3) explored reflective rumination, specificity of thoughts and goal attainment. Participants completed the Rumination Reflection Questionnaire and Purpose in Life Ryff subscale. Results indicated significant findings for objective 1 and 2, but only found trending results for objective 3. Thus, trait reflective ruminative tendencies in conjunction with more specific and concrete thought content lead to individuals adopting a more goal oriented thought process and the sense of a higher purpose in life. Overall, the study found benefits for utilizing reflective rumination especially in conjunction with purpose in life and specificity of daily thought content.

Matias Yegros

"Yield and Quality of Greenhouse Grown Tomato"

ABSTRACT: One tomato cultivar (*Lycopersicon esculentum* cv. Speedella) was grown hydroponically using three different growing media bag treatments in Tucson, Arizona. Each growing bag contained a mix of coconut coir and peat moss with a proprietary mycorrhiza. Plants were grown to assess the fruit quality and yield of each treatment throughout seven weeks in the summer (June and July 2018). At the time of this evaluation, tomato plants were nine months old and cultivated under the same fertigation solution and microclimate inside a 107 m2m2 glass greenhouse. Each treatment was composed of nine bags with six plants per bag, and one plant from each bag was selected to measure the total soluble solids (TSS, % Brix) during the experiment. Fruits were harvested each week on the same day and time between 'breaker' and 'red' ripeness stages. Trusses were weighed and the second fruit (the queen fruit) of the selected plants was used to measure TSS each week. Results show that there was no significant difference for TSS and yield between treatments. However, there may have been other variables that could have affected plant yield and TSS, such as outside climate and age of plants. A further study should be conducted to look at substrate performance at different mycorrhiza conditions to utilize the benefit over a longer period of time.

Olivia Cote

"Thermoacoustic Imaging Informed Focused Microwave Therapy for Treatment of Early Breast Cancer: Preliminary Procedures"

ABSTRACT: Breast cancer is the second most diagnosed and second most deadly cancer in the United States. Current diagnostic tools and treatments are inaccurate, costly, or invasive. Thermal acoustic imaging (TAI) is a promising imaging system for detecting small tumors in patients, and focused microwave therapy (FMT) is a technique for achieving tumor necrosis without surgery or other adverse side effects. Though studied and tested separately, little research has been done in a system integrating both TAI and FMT into a single system. This study will utilize TAI to guide and inform the FMT system in real time, so therapy can be more aggressive to the tumor while safer for the patient. This paper describes the preliminary steps taken toward construction of an integrated system and lays out the next steps for the study.

Graig Lopez

“Physicians’ Hispanic Implicit Bias and Clinic Interaction Quality”

ABSTRACT: In this paper doctor-patient interactions are examined to see if a residents’ implicit bias towards Hispanic patients may influence the interaction length. To do so the paper draws on research conducted in Tucson, Arizona at the University of Arizona’s School of Medicine. 57 residents were enrolled in the study and 291 Hispanic patients enrolled respectively. Residents were administered two Implicit Association Tests, one relating to implicit prejudice, the second relating to implicit stereotype. An aggregate score was extracted from these two tests to implement one implicit bias score for the current research. The paper considers whether a resident’s race moderates the implicit bias and interaction length relationship. Previous research demonstrated that a doctors’ implicit bias may influence the interaction length with more biased doctors having longer interaction lengths with Black patients (Cooper et al.2012, Hagiwara et al. 2017). Furthermore, this research analyzed how resident language usage relates to bias during the medical interaction, linguistic inquiry word count (LIWC) was implemented to examine three categories of word usage. These were interrogatives, work related words, and future oriented words. By examining these three categories this research aims to extract a theme for each category and demonstrate how these relate to a doctors’ implicit bias and may influence patient satisfaction and adherence to a medical plan.

Audreunna Cleveland

"A Case Study: Examining Sleep, Mood, and Lifestyle Choices in 911 Telecommunicators"

ABSTRACT: 911 telecommunicators are trained to collect essential information from callers and dispatch the appropriate responders while remaining composed and keeping callers calm. Work demands of 911 telecommunicators include 12 hour rotating shifts, mandatory over-time, limited autonomy, and no closure after disconnecting from callers. Despite the vital role 911 telecommunicators play in connecting community members to emergency services, few studies have examined how work demands and sleep affect the mood and lifestyle choices of 911 telecommunicators. This case study analyzes data from one participant in an ongoing study examining how pre-shift sleep and types of calls received affect the emotions, activity, and caffeine intake of 911 telecommunicators. The present study focuses on one participant: a 34 year-old female employed as a 911 dispatcher for 2.5 years. Over the course of a 14-day cycle, she wore a wrist and hip activity monitor used as objective measures of sleep and energy expenditure, completed a daily sleep diary, logged daily caffeine consumption, completed pre-shift and post-shift surveys measuring mood and reaction time, and completed a series of cognitive tests. Preliminary results show the participant had a reduced mean reaction time after work, along with increased irritability, and loss of interest. On average, her total sleep time was reduced by one hour and it took her 23 minutes longer to fall asleep during on-shift days compared to off-shift days. These results highlight some of the challenges 911 telecommunicators face and the need for programs targeting health promotion in this unique population.

Jesús Eduardo González Franco

“Using LingView as a Tool in Language Documentation”

ABSTRACT: This research paper highlighted the importance of language documentation and contributed to the preservation of endangered languages by offering a case study on the documentation of Desano and Siriano, two highly endangered Eastern Tukanoan languages of Brazil and Colombia. The Desano and Siriano language fieldwork notes and audio files previously documented and archived through the Desano Language Documentation Project (henceforth DLDP) were used to create a web user interface, called LingView, for the Desano community, linguists, and general public to access. Aside from tools used during fieldwork, the project used ELAN to segment and time align annotated transcriptions with audio-recorded stories as a supplement into LingView’s database. LingView is a free software that is easy to use and can display ELAN files in a format that allows the viewer to follow along with the audio recording and transcription. The purpose of this project is to show that language documentation projects can use ELAN and LingView to easily and affordably creates a web interface for any endangered language. Lastly, the Desano and Siriano case study proves that the LingView is great software that can preserve the language and culture and disseminate the Desano and Siriano stories to the community and the world.

Hyun A Lee

“A New Family: Evaluation of Camp Born This Way”

ABSTRACT: Transgender and/or gender nonconforming youth are often stigmatized, which can be detrimental to their well-being. The purpose of this study was to evaluate Camp Born This Way, a four-day, three-night camp designed to support transgender and/or gender nonconforming youth and their family member(s) residing in Arizona. In this paper, trans- is used as an umbrella term to address transgender and/or gender nonconforming youth, as it introduces openness and unboundedness to conceptualizing trans- experience and identity (Stryker, Currah, & Moore, 2008). The study focused on trans- children in middle childhood (ages 8-12) as they are typically prepubescent and, developmentally, display increasing autonomy. As they age into puberty, some children express fears about the bodily changes that puberty brings, and many expand their attachment figure to peers from their parents (Seibert & Kerns, 2009). The study employed The Developmental Assets® Framework for middle childhood (Search Institute, 2006) to identify ways Camp Born This Way has been serving trans- children in middle childhood and their parent(s),and utilized a descriptive design with both qualitative and quantitative analyses to examine camp outcomes. Findings include strengthened self-esteem, understanding of gender, and connectedness, as well as an increase in child and parental advocacy. Camp Born This Way’s role as a social institution for cultivating trans- advocacy is examined and recommendations for future CBTW evaluations are made.

Alison Watson

"Stem Cell mRNAs Control Gene Expression and Contribute to Prostate Cancer Progression"

ABSTRACT: Prostate cancer (PCa) is one of the most diagnosed forms of cancers found within patients (Mundy, 2002). Majority of processes within PCa are produced through the development of metastasis. The transcription factor known as SNAIL1 is upregulated during PCa epithelial-to-mesenchymal transition (EMT) contributing to metastasis in stem cells. The primary foundations leading to cancer tumor growth are established through a set of complex molecular processes including EMT. Numerous studies have demonstrated that TGF-b signaling pathway and MEK/ERK signaling pathway lead to the upregulation of SNAIL1 during EMT (Goodwin et al., 2014). However, little is known on how SNAIL1 is upregulated in prostate cancer stem cells. Recent studies indicate that DIXDC1, an understudied scaffolding protein, is associated with focal adhesions and functions as a suppressor as induction of the SNAIL1 gene expression (Fraley, 2010). MARK1/4 of phosphorylation is required for the DIXDC1 localization to focal adhesions and suppression of metastasis. Our results show that expression of the stem cell microRNA cluster miR-302-367 targets DIXDC1 mRNA inhibiting its level of expression. The reduction of DIXDC1 with siRNA shows increased expression of SNAIL1 levels. These results along with others, suggest that the knockdown of DIXDC1 leads to MEK/ERK translocation from the cytoplasm to the nucleus to activation transcription of SNAIL1. Collectively, our findings further suggest that the miR-302-367 cluster in cancer stem cells regulate SNAIL1 in a similar manner by targeting DIXDC1 (Figure 1). Further studies are required to evaluate whether DIXDC1 is mutated or downregulated in human PCa.

Christina Mu

"Predicting Executive Functions from Physical, Social, and Mental Activities in Older Adults Over 50"

ABSTRACT: Executive functions (EFs) are an essential aspect of cognition. EFs are described as a set of abilities which allow individuals to control information. The unity and diversity of EFs separate EFs into updating, shifting, and inhibition subcomponents. Extensive research argues that with age some cognitive abilities deteriorate. To counteract this process, researchers have highlighted the potential benefits of engaging in activities (i.e., physical, social, and mental activities) as one ages. This study examined which of the activities would be the best predictor of EF subcomponents and EFs in general. Furthermore, considering how nearly one-third of all adults are being diagnosed with hypertension, this research will explore the impact of this on executive functioning abilities. Fifty-six healthy older adults (Range = 50-80 years, M = 69.2, SD = 6.67) from the community were administered cognitive tests and a questionnaire to measure the frequency at which they engage in activities. Fifteen of the participants were hypertensive. The current study hypothesized that each activity would have a unique relationship with the EFs subcomponents and general EF. However, the findings indicated there was no significant relationship between the activities and EF subcomponents. Instead, the results indicated that age was highly predictive of general EF and updating EF. For both models, as age increased, general and updating EF performance decreased. In addition, hypertension status was a significant predictor of general EF, such that those with hypertension had poorer general EF in comparison to normotensive individuals with higher general EF.