TIED FOR FIRST PLACE

Team Members:
Haya Al-Duroobi (Environmental Sciences & Engineering), Sina Vedadi Moghadam (Civil Engineering), Katrina Poling (Environmental Sciences & Engineering), Robert Salinas (Geology), and Arash Jafarzadeh (Civil Engineering)

Project Title:
Wastewater Surveillance of SARS-CoV-2 for Monitoring Community-wide Disease Outbreak in San Antonio, Texas

Abstract:
Currently, the traditional approaches to community-wide health assessment are based primarily on clinical testing; however, wider access to testing for SARS-CoV-2 has so far been severely limited due to logistical difficulties and high costs. Therefore, the rapidly evolving research area of wastewater surveillance has significant potential and high feasibility to serve as an early, cost-effective, community-level indicator for the presence of SARS-CoV-2. Wastewater surveillance involves sampling wastewater from treatment plants and testing for the genetic material of this virus. Similarly, samples collected from wells can be used to assess SARS-CoV-2 groundwater contamination due to leaking sewage pipelines and septic tanks. It has been a rapidly evolving national and international research effort to identify robust techniques for sample collection, sample analysis, data interpretation, and communication for SARS-CoV-2 wastewater surveillance. Therefore, with the readily available resources, UTSA can be a part of this effort which would allow it to achieve national and international recognition as part of its Research Excellence initiative. The project team involves graduate students from the transdisciplinary fields of Environmental Science and Engineering, Geological Sciences and Civil Engineering who are collaborating on sample collection, sample testing, data analysis and providing engineering and public health recommendations. Raw sewage samples (24h composite) and grab groundwater samples will be collected weekly from the selected wastewater treatment plants and wells and transported to the laboratory at UTSA. Subsequently, molecular analysis of samples will involve utilization of different assays to maximize RNA detection/ quantification and minimize contamination and interference. The quantitative data on SARS-CoV-2 prevalence can be reported out in viral RNA copies per volume of wastewater for a specific treatment service area or assessed in smaller catchment areas. Through this project, UTSA can expect potential recognition and partnerships with local public health authorities as well as wastewater utility service providers such as San Antonio River Authority (SARA). More importantly, UTSA would be able communicate valuable data about the SARS-CoV-2 prevalence in sampled communities to wastewater utility workers and the public. This supportive information can guide quarantine/mitigation measures that affect individuals and their behavior.

TIED FOR FIRST PLACE

Team Members:
Beatrice Ruiz (Psychology), Mir Mehedi Pritom (Computer Science), Sebastian A. Nugroho (Electrical Engineering), Esra'A Alrashydah (Civil Engineering), Rosana Montanez Rodriguez (Computer Science), and Asad Ali Khan (Electrical Engineering)

Project Title:
Countering Ubiquitous COVID-19 Health-Related Misinformation: A Transdisciplinary Approach

Abstract:

Countering COVID-19 health-related misinformation poses a unique challenge that typical health campaigns do not encounter, which is trying to remove the continued influence of misinformation. Unlike previous research work on COVID-19 misinformation, this study addresses the existing multidisciplinary techniques that help understand, detect, and provide solutions for the genuinely transdisciplinary problem of correcting misinformation during the COVID-19 pandemic. The main goal of this research work is to build a robust defense framework to detect and effectively correct health-related misinformation using methods grounded in data science and psychology. Our objectives are, 1) contribute to the advancement of methods to counter COVID-19 themed health misinformation spread in social media by applying transdisciplinary tools and techniques, 2) explore the applicability of developing a robust defense framework based on natural language processing (NLP), machine learning, and cognitive science approaches to counter misinformation., and 3) develop a data science assessment strategy grounded in psychology to assist public health officials in identifying health-related misinformation in real-time.

This research can be applied to future public health crises as well as future events that have widespread misinformation. Specifically, the research adapts leveraged state-of-the-art methods from data science, applied machine learning, social psychology, cybersecurity, community health, and public response. The study leverage NLP techniques such as bag-of-words, n-grams, and analyzes the performance of state-of-the-art machine learning classifiers like Naive Bayes, Support Vector Machine (SVM), Random Forest, Logistic Regression, and K-Nearest Neighbors (KNN) to detect misinformation from the accurate information. Another study in the research leverages social psychology to identify approaches to effectively correct misinformation. The expected results of this research will provide a strategy to understand and correct public responses through social media.

The developed data science assessment strategy will improve the coordination of the public health system response through sharing surveillance and diagnostics with the correct information. The developed approach will assist public health officials to better communicate with the general public in several ways. The research results are expected to have a significant impact on UTSA in several ways. UTSA will be credited with a framework that can detect and provide early alerts on misinformation correctly. This will serve the community by reducing the misinformation impact not only on the local community's health but also from a national perspective, which might improve the public health response. The UTSA research team is also uniquely positioned to have an effective correction strategy for misinformation.

TIED FOR THIRD PLACE

Team Members:
Nguyen Dao (Culture, Literacy, and Language), Andres M. Aguirre-Mesa (Mechanical Engineering), Orlando Graves Bolaños (Interdisciplinary Learning and Teaching), Lina Martin-Corredor (Culture, Literacy, and Language), and Elizabeth McMillan (Early Childhood and Elementary Education)

Project Title:
Dodge Corona: Promoting STEM learning in The Age of COVID-19 through a Culturally Relevant Online Game

Abstract:
Amidst the global changes in the context of COVID-19 pandemic, our team proposes an interactive online game utilizing cross-disciplinary expertise in STEM education, bilingual education, and engineering to help our San Antonio (SA) community gain educational experiences and critical perspectives. Our project corresponds to UTSA's recent health awareness campaign that promotes all community members' engagement following a philosophy of shared responsibility by designing of a culturally and linguistically relevant pedagogical tool through a game called Dodge Corona. Our primary goals include (1) improving understanding and awareness of disease transmission, (2) providing an authentic, real-world example of foundational engineering concepts of operations and data visualization through exploration of exponential growth and mitigating factors, and (3) engaging youth in critical reflection of the varied personal experiences in our community that impact equity and choice during a pandemic.

We draw on the conceptualizations of culturally responsive pedagogy (Ladson-Billings, 1995; Flores et al., 2015) as the model to foster knowledge, develop cultural proficiency, awaken cultural consciousness, actualize cultural and critical responsivity and realize cultural efficacy. Also, Lesh and Doerr's (2003) six principles of MEA provide us with a structure to define both game components and measuring participants' understanding of STEM concepts and 21st-century skills bilingually in Spanish and English, including mathematical modeling, data trends, exponential growth, the transmission of viral diseases, and problem-solving. These two frameworks will allow us to provide a gamified experience that informs and influences the decision-making process of SA community members regarding their choices of action that can be impactful to public health and community awareness. The mechanics of the game is influenced by My Hero Journey, an already available exhibit at the DoSeum. Furthermore, our community partnership with the DoSeum assures the preparation of the game prototype and implementation.

Methodologically, this project will employ a mixed-methods action-research in order to gain insights into the development of Dodge Corona. Data drawn upon existing descriptive-statistical data and semi-structured interviews will inform the design of the characters and scenarios to reflect the lived experiences of real SA community members in the game storylines. Additionally, we will conduct a pilot study that will assess the appropriateness and effectiveness of our game. Our participants will involve SA community members from different racial, ethnic, linguistic, and socio-economic backgrounds that we will recruit through a Spanish-English two-way dual language public school. Participants will play Dodge Corona, complete a survey and participate in an online/phone interview. Results from this pilot study will help us in the redesign of the game if need be. Optimistically, this last product will ultimately take the form of a DoSeum exhibit. This research-based initiative looks to present, connect, and empower children to the ways in which STEM education is directly connected to our day-to-day lives. In so doing, we hope to bring about a positive impact on the health and social equity issues that entail the spread of COVID-19 in our community, thus aligning with UTSA's mission and public health initiatives.

TIED FOR THIRD PLACE

Team Members:
YoungHyun Koo (Environmental Sciences & Engineering), Bethsanie Sanchez (Curriculum & Instruction), and Jullian Williams (Environmental Sciences & Engineering)

Project Title:
Socio-economic and Environmental Impacts of COVID-19 Pandemic in Texas

Abstract:

The aim of this proposal is to apply geospatial techniques to explore the socio-economic and environmental impacts of the COVID-19 outbreak in Texas. The World Health Organization (WHO) declared COVID-19 a pandemic in March 2020 and this unprecedented virus has brought large changes to the globe. Understanding the spatial relationships between COVID-19, economic changes, atmospheric conditions, and public health are integral to the disaster mitigation in the event of future outbreaks. First, as for the socio-economic impacts of COVID-19, we will focus on analyzing geospatial data, demographic data, and people's foot-traffic data. The outbreak of COVID-19 caused the downturn of the local economy, represented by the unemployment rate and retail sales. Since this economic impact can vary with the economic structure of each county, we will figure out what type of economic structures exist in the major cities of Texas (San Antonio, Austin, Houston & Dallas), and which are most vulnerable to the pandemic. Moreover, based on the demographic information, we will investigate the impacts of this pandemic to the educational system regarding the accessibility to the online learning system. Second, in the respect of the environmental impacts, this COVID-19 situation has led to the dramatic decrease of air pollution and greenhouse gases due to the much reduced social and economic activities. Based on the foot-traffic data, we will estimate the decreased emissions in this pandemic period. Then we will compare these estimations with the real emissions measured by monitoring stations or satellite data. Therefore, this project undertakes a multi-layer approach in describing and quantifying the relationships between COVID-19 and socio-economic or environmental factors. This information can provide valuable insight on how we can manage public health disasters, and even how we can manage the recent environmental issues under the warming climate.

DEAN'S CHOICE AWARD

Team Members:
Anna Slade (Clinical Mental Health Counseling), David Robinson, Jr. (Urban and Regional Planning), and Gigi Kamali (Business)

Project Title:
Life Under COVID-19: Oral Histories of Small Businesses in the Historic Westside of San Antonio

Abstract:

We are living in the epicenter of a tsunami: COVID-19's serious health risks, its social and economic upheaval, and the attention it calls to the plight of the marginalized. Our project focuses on one of those groups. Aligned with UTSA's Strategic Initiative to "amplify the economic and cultural strengths of the Westside," and aligned with UTSA's Core Value to "encourage an environment of dialogue and discovery" we propose an in-depth, focused set of Oral Histories with a cross-section of small business owners in the Historic Westside of San Antonio.

We contend there is scientific merit in the process of deep listening to the experiences of our target population, analyzing their stories for key themes, and sharing the findings with city leaders and San Antonio's population at large. We believe there is historic value in saving the Oral Histories for future study. Our goal in the Histories is to gather and examine evidence of the surface and structural personal, economic and societal damage from COVID-19 to this segment. It cannot be unwound from racism. We believe effective solutions start by defining the problems accurately. We believe defining problems start by listening to those impacted.

Small business owners in the Historic Westside are an important, historically marginalized element of San Antonio, particularly in its urban core. They represent the diversity that makes our city unique among others in the United States. Sadly, they also exemplify what City Councilman Manny Pelaez said when he described our city as "the largest poor city in America" (Mendoza-Moyers, D., 2020, June 14). Damage to this segment will change San Antonio's important tourism industry, the character of downtown and the River Walk, and UTSA Downtown's Strategic Initiatives. Most importantly though, COVID-19 might be the death knell to the Historic Westside.

Our little project can't save the Westside by itself. But if our project is successful, we believe the UTSA Oral Histories can be an effective megaphone. Our goal is to record a minimum of ten Oral Histories of a cross-section of small businesses in the Historic Westside. We are sure we will hear voices of frustration. We also believe the business owners' stories will point the way to corrective actions.

Our project will define the methodology and propose a set of topics/questions for the Oral Histories. We will also define the resources needed if this project were to be carried out. Irritatingly, the nature of the social distancing set in place as a weapon against COVID-19 will complicate our project. The interviews will have to be done via technology.

We are not trying to reinvent the wheel. We are aware of and greatly respect the many existing organizations on the Westside, and their partnership with UTSA. Westside Development Corporation has agreed to be our community partner. We respectively believe our project will be a valuable adjunct, and not a duplicate to work that is already ongoing.