

**PREDICTING FINE-GRAINED CUMULATIVE COVID-19 INFECTIONS AND  
ANALYZING COVID-19 TWEET SENTIMENTS**

**COMMUNICATING TRUSTWORTHY INFORMATION TO REDUCE THE HEALTH  
DISPARITIES OF UNDER-RESOURCED AFRICAN AMERICAN COMMUNITIES  
DURING THE COVID-19 PANDEMIC**

An Undergraduate Thesis Portfolio  
Presented to the Faculty of the  
School of Engineering and Applied Science  
In Partial Fulfillment of the Requirements for the Degree  
Bachelor of Science in Computer Science

By

Marina Kun

May 6, 2021

## **SOCIOTECHNICAL SYNTHESIS**

The outbreak of the COVID-19 pandemic has exposed and exacerbated the United States' existing health and racial disparities. Worsening the situation, there is a prolific amount of false information which has hindered efforts to control the spread of the virus. The technical project aims to mitigate the impacts of COVID-19 by providing trustworthy information regarding local trends of the virus using machine learning techniques. The development of such technical tools or channels that provide information about COVID-19 must consider communities burdened with health inequities. Therefore, the STS research paper serves as a case study that addresses health disparities experienced by under-resourced African American communities while understanding their perceptions of COVID-19. Coupling the technical project with the analysis of the STS paper provides a meaningful and novel approach to communicate trustworthy health information that can ultimately improve health outcomes and reduce health disparities.

The coronavirus disease is highly contagious, so it requires close monitoring to control its spread and reduce negative health outcomes. The technical project addresses these requirements as it identifies community trends of the disease using models that forecast cumulative COVID-19 infections and analyze tweet sentiments of safety guidelines regarding the virus. The web application of the project also displays further details about the models to facilitate trust among users and guide them to make accurate and unbiased interpretations of the data. By providing trustworthy and accurate health information, the project can influence safe and effective decisions regarding safety guidelines which will mitigate the transmission of the virus.

The cumulative infection model achieved an accuracy of 87%, and the tweet sentiment analysis model resulted in an accuracy of 89%. The web application provides a clear representation of these forecasted case predictions and the region's view towards

safety measures quickly, efficiently, and in a manner that is easily understandable. Ultimately, the project can contribute valuable information which can reduce the rate of COVID-19 infections and mitigate negative health outcomes.

Improving health outcomes is not possible without addressing the issues that arise in the American health care system due to structural inequities. The STS research paper aims to reduce the health disparities that exist within under-resourced African American communities by improving the accuracy and trustworthiness of COVID-19 information. To address these issues and arrive at a solution, the research paper analyzes numerous sources from communication and health experts as well as members and leaders from the African American community. Furthermore, the foundation of the solution is based upon the analysis of the COVID-19 information network using Latour, Law and Callon's Actor Network theory.

According to medical experts and African American leaders, there is a legacy of medical mistrust within the African American community that stems from historical and present-day unethical experiences of racism and discrimination within the health care system. Other communication experts analyze how misinformation exacerbates medical mistrust. Testimonies from African Americans in under-resourced communities explain that the spread of misinformation leads to further apathy, distrust, and confusion. Furthermore, the analysis of the network of COVID-19 information elucidated unethical qualities within the communication channels. Finally, the analysis of the research paper led to a solution to address health disparities by employing a technical channel to filter out inaccurate information and leveraging the influence of community leaders to provide trustworthy information.

The investigation of the unethical COVID-19 communication system and its impact on African American communities is essential for the development of an ethical and trustworthy

application that provides accurate COVID-19 information. Overall, the construction of a trustworthy network of communication led by influential and trusted leaders coupled with an application that provides local trends of COVID-19 will lead to a tremendous improvement in ethical health outcomes for under-resourced African American communities.

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With Morgan Freiberg

Technical advisors: John Stankovic, Department of Computer Science

Vicente Ordonez-Roman, Department of Computer Science

#### **COMMUNICATING TRUSTWORTHY INFORMATION TO REDUCE THE HEALTH DISPARITIES OF UNDER-RESOURCED AFRICAN AMERICAN COMMUNITIES DURING THE COVID-19 PANDEMIC**

STS advisor: Catherine D. Baritaud, Department of Engineering and Society

### **PROSPECTUS**

Technical advisors: John Stankovic, Department of Computer Science

Vicente Ordonez-Roman, Department of Computer Science;

STS advisor: Catherine D. Baritaud, Department of Engineering and Society