**Introduction**:

As of late, social media has been scrutinized for its role in negatively impacting society as a whole. The notion is that major platforms, like Facebook, Twitter, and Instagram, have contributed to the deepening divide in politics that has plagued America over the past several election cycles. Additionally, these social media platforms are being accused, for example in the Netflix movie, “The Social Dilemma”, of depleting the mental health of its large following of youth users. However, this paper will focus on how the raw power of social media can be harnessed to help benefit society. Namely, the problem that this paper will propose as a solution to is how social media can be used to help identify and respond to emergency situations, such as natural disasters or intense shows of civil unrest. The approach that will be taken to achieve this is based in Machine Learning and Natural Language Processing techniques.

In the disaster management life-cycle, there are four core stages: prevention, preparedness, response, and recovery (Abedin et al. 2017). Although the best plan in disaster management is without a doubt the “prevention” of some disaster, there will inevitably cases where prevention fails. Therefore, this paper will focus on providing a tool in aiding the “response” step of the life-cycle. Through the combination of Machine Learning techniques and the massive amount of live data, streaming through social media platforms, a new age style of responding to large scale disasters can be built. Traditional information reporting techniques inform the public about emergency news in a stagnant and centralized manner; through only a handful of new outlets, few viewpoints, and limited resources. Platforms, such as Twitter, provide a unique, decentralized, approach to quickly share information from a pool of resources that are only limited by their numbers of users, which is quite extensive. If this large amount of data form on the ground sources, or rather Twitter users currently in the mix of some disaster event, can accurately be classified, through the use of Machine Learning techniques, the benefits to emergency response can be immense. This is imperative to disaster management because improving response to a disaster will lead to both less fallout and a quicker recovery for all parties involved.

The inspiration for this work stemmed from the crisis that struck Washington DC on January 6th, 2021. The capital riots were a bi-product of the aforementioned divide caused by the polarizing nature of our social media platforms. During the unfolding of the events, these same platforms showed that they can be useful as a tool in helping respond to such crises and disasters. Twitter users during the riots were providing constant updates which could have proved useful to emergency responders and law officials. Taking a probe of the temperature of users or seeing geographically where volume is high may help with the tactically distributing units to properly respond dynamically. Social media platforms are evening being used in the ongoing response, in terms of court cases and trails, through provide evidence for prosecuting those accused of wrongdoing on that day. However, one of social medias greatest benefits in a data analytical sense is a also a pitfall to emergency responders utilization of these platforms; the sheer amount of data that needs to be processed. This is why Machine Learning techniques are optimal for building a solution to this particular problem.

The scope of this paper will be to develop a model that can used to classify tweets simply as either regarding to a disaster or not regarding to a disaster. This will be achieved using a large corpus of prelabeled data, in the form of Twitter Tweets. The model will be built, using NLP techniques, in the form of a sentiment analysis classifier. After the model is build and properly trained, a randomly selected, predetermined, subsection of the data will be used to test the accuracy of the model. The main objective of this project is to have a working model that can take Tweets as input and output the classification of whether are not the are about a disaster. The “response tool” will in essence be a way to filter Tweets, with a high degree of precision, that are pertaining to a disaster of some kind from the rest of the pack. This will be beneficial in helping emergency responder pinpoint disaster level events and in turn response more efficiently to live information from those on the ground.