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Title of Project: ARTIFICIAL INTELLIGENCE-BASED DEPLOYMENT OF EMERGENCY RESOURCES FOR NATURAL DISASTERS

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Category: Behavioral & Social Sciences (BEHA) **Division:** Junior (6th - 8th grades)

Abstract (250 words or less):

In the past decade, there have been 99 climate disasters, 24 tropical cyclones, 17 floods, 10 droughts, 9 wildfires, and up to 159 natural disasters since 2013. They kill around 45,000 people per year, making up 0.1 percent of deaths in the last 10 years, because these people didn't get help fast enough. Twitter is the most used social media platform for disaster relief communication. Is there a way to create an online platform, maybe not a social media platform, with AI that could make it easier for first responders to help those in need during natural disasters? I wanted to create an app that you could type a help message into, and it would automatically send a message about this message to the closest first responder location. I wanted to make this more open so that first responders could obtain resources and not only have to give these resources. I put these in 4 categories: food, water, medical, and energy. Then I had another classification after that, need or resource. "Need" is if you require a particular resource, and "Resource" is if you have the resource (or can provide help). To create this with AI, I needed to use NLP fundamentals. This study is being done because whenever there is a natural disaster, many people die when they could be saved. And by creating a resource like this, we could minimize casualties.

There were four steps to creating this algorithm: text data, numerical data, algorithms, and predictions. For text data, I had to make the message quick and simple for the computer to understand. There is a 3-step process to do this. First, "Tokenization" splits a long string of words into individual words. Then "Stop-word removal" gets rid of common words like "the" or "a". Then, "Stemming/Lemmatization" shortens words to their root by removing endings like "ing", "-ed", "-ion", and so on. After this, I had to use one-hot encoding to change the text data into numerical data, making the simplified words into numbers of 1's and 0's for the computer to understand.

When I had the message easily readable by the computer, I had to put it through an algorithm to classify it as related to food, water, energy, or medicine. To train the algorithm to recognize the category that the message is in, I used 1400 different tweets from one of the biggest hurricanes that affected many people, Hurricane Sandy, which was given to me by Inspirit AI. I took keywords from these tweets and connected them to the exact category they were in to create a "bag of words", a list of words that help classify a message's category. But for the AI to even be able to recognize these words, I needed to simplify them. Once I put this "bag of words" into an algorithm to create a prediction and wrote a couple of "if" statements, the algorithm put a statement out predicting the inputted sentence's category. I also needed to help the AI categorize the words. To do this, I used four different functions. X_train, Y_train, X_test, and Y_test. The X is the text in the tweet example, and the Y is the label of the tweet examples. The _train function teaches the algorithm and is the variable that carries the data. The _test function tests if the algorithm is correct. This identifies and checks the category in which the text given to the algorithm is in. Then, after the algorithms, I had to test how accurate the algorithm was. I used the accuracy score function to find this out. This function took the data from the X variable, which has the actual data, and then compared it with the algorithm's prediction.

My next step is to create an app that would classify massive data of tweets into "Need Based" or Resource Based" categories so that first responders can respond appropriately.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature: _Sunyother_ **Date:** 3/7/24

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES o all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.