Analyzing Weather Data During a Government Shutdown

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Government Shutdown

Congress has adjourned and the Federal Government of The United States of America will shut down for an unknown amount of time. As professional storm chasers, the greatest impact on our business will be the partial furloughs at the National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA.) “For NOAA, about 50% of its workforce would be shuttered. However, National Weather Service personnel that provide critical weather forecasts for the nation will still work.” (Shepard, 2018) While it is somewhat of a relief that we will have some personnel on duty during the holiday shutdown, millions of American travelers are counting on accurate forecasts to get them to safety to their destinations. Let us not forget that television and smartphone weather forecasting is dependent on Federal models that are generated by NASA and NOAA. To this end, I propose the industries most severely impacted such as airlines, freight, and e-commerce come together to build and maintain a weather forecasting database and analytics system to get our nation through this, as well as future disruptions caused by government shutdowns.

**Datapoints**

There is substantial infrastructure in place at our nation’s airfields large and small whose purpose is to generate data for weather forecasting. The trouble during a shutdown is that the federal forecasters who analyze this data are either furloughed or getting paid with IOU’s right in time for the holiday season. When we take a step back and consider the human factors in play, it is not a stretch to see how the quality of work will likely suffer, leading to inaccurate forecasts. These weather systems are automated, and report in the form of a publically available report that is called a Meteorological Terminal Aviation Routine Weather Report (METAR.) Here is an example and explanation of the terms of a METAR:

KMEM 230853Z AUTO 18014G18KT 10SM CLR 16/M02 A3008 SLP117

KMEM=4-letter ICAO location indicator, 230853=Date and Time of observation  
18014G18=Wind direction in tens of degrees,10SM=Visibility in meters, Cloud cover=CLR clear below 12,000 feet, 16=Temperature Celsius, M02=Dewpoint Celsius, SLP117=Sea Level Pressure in Millibars (Dixwx, 2018)

From this data, we could set up an SQL relational database which could be queried to produce any number of weather products from charts to tables.

**Neural Network**

The raw data collected from METAR stations is a vast collection of detailed weather history for the developed world. I believe that if we were to correlate historical textual weather data with historical satellite imagery, we would have a strong dataset for a neural network to analyze trends from the past and begin to predict the track of future storms. A student named Andrew Culclasure presented his Master’s Thesis in 2013 to Georgia Southern University on the topic of applying Artificial Neural Networks to the forecasting of local weather and his results were stunning. Culclasure concludes:

Three neural network architectures are applied to experimental datasets in order to forecast minimum temperature values, maximum gust values, freezing event classifications, and gusty event classifications. This experiment revealed that RPROP and PSO neural networks can predict minimum temperature values very effectively up to 24 hours out regardless of the base dataset used. (Culclasure, 2013 p.67)

The limitations the study encountered had to do with “such as the importance of  
normalizing data, methods of dealing with imperfect training data, and approaches to  
selecting predictor variables.” (Culclasure, 2013) I believe that if we tap into real life aviation weather data, many of these obstacles will be solved. There are, however, ethical considerations that must be evaluated when using public utilities like airport weather stations for a private project such as this. Our response to objections of this sort is that our modern society requires a functioning, funded government in order for its citizen's safety. When such time as the government fails to provide this, the citizenry must join together with private industry to ensure each other's prosperity.

References

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