Harry Scells
Craig Craci
28 January 2015

Candidate Topics For A Research/Programming Project

Predictive analysis of the weather using twitter

This project aims to use geographic data from twitter to predict the weather based on the content of tweets. Using the geo-data attached to every tweet and lexical analysis of the content of the tweet, it can be mapped to a graph which, with enough training, should be able to determine the weather. With enough user input and data, it should be possible to produce a geographical map with the predicted outside conditions. This project will involve artificial intelligence to analyse text, attempt to determine if the text contains weather conditions, make a generalisation against users tweeting about the same content, and map it to a geographical area.

Analysis of mass amounts of social media is in the realm of big data, which is an emerging area of research and can provide some insight into crowd sourcing information. There have already been projects aiming to make predictive analysis of tweets, including predicting earthquakes and typhoons. The outcome, like similar projects of this kind, should be that of getting results before existing technologies and systems can provide them. It can also benefit people whom are at risk of tornados and snow storms in North America.

The results of the project will be evaluated against current weather conditions. This includes overlaying both datasets above each other to determine how close the predictive analysis is to already established and trusted methods of weather prediction. The text analysis, prediction and mapping will all be implemented in lisp, with the networking in python. The resulting output will be a graph plotting the relationship between the temperature (hot or cold which could infer a heatwave or snow or rain) against the original location of the tweet (east coast to west coast America). The output will also aim to provide a geographical map with overlays, however this can be done well into the end of the project.

Creating image filters using feature extraction algorithms and artificial intelligence

The second project will attempt to apply a filter to an image based on several input images. The AI will attempt to 'learn' the way an artist paints and generate a reasonable image filter from the inputs. The program will use several pattern recognition and feature extraction algorithms in order to produce a set of rules or heuristics to apply to other images.

For instance, if a particular artist uses pointillism, the resulting filter should apply a variety of similar techniques in order to achieve the same effect. For instance, if the AI is trained on pointillism paintings, the input image on the left should produce a similar output to the one on the right.

The artificial intelligence written purely in LISP will employ several already established pattern recognition algorithms and feature extraction algorithms in order to create a set of rules. These algorithms include blob detection, scale-invariant feature transform (SIFT) and salt-pepper noise detection.

The image filters that are produced will hopefully be able to match an artists style and technique if the are very well defined. The main thing to take out of this is that the program won't generate it's own images, it will learn an artists style and apply a filter to an input image.