Quantum Computing for Weather Prediction

**Abstract:**  
The weather is an important part of human life. The weather determines the agricultural output of the society, as well as boost or slow down renewable energy production. Extreme weather events can bring forth devastating economic and societal loss. Thus, accurate and quick weather prediction is becoming increasingly necessary in todays world where the weather becomes increasingly unstable due to climate change. The results from this project can also be carried onto other classification problems like disaster classification and classification of medical events. In the future, with the availability of more qubits, we can also use complex quantum deep learning algorithms.

**Introduction:**

Majority of weather classifiers are done using Naïve Bayes, Chi Square, KNN and SVM. Deep learning models are also used. This project is going to use classical KNN and SVM algorithms and compare them to the quantum SVM measurements. The dataset used is the Austin\_weather.csv from Kaggle.

**Methodology:**

First we create multiple KNN models with different number of neighbors. We will then measure the time taken and accuracy of these models both during training and prediction. We will then create multiple SVM models with different kernels and different margin softness and measure the time taken and accuracy for both training and prediction. We will then compare them to the measurements of a QSVM model. The dataset will be from the Austin weather dataset from Kaggle.

Outcome:

KNN(16 neighbors): Accuracy: 0.7651515151515151 Time: 0.01974773406982422

SVM(linear): ACC: 0.8143939393939394 TIME: 7.362624883651733

SVM(poly) : ACC: 0.7878787878787878 TIME: 0.10174989700317383