

# Quantum-Inspired Approach for Rainfall Prediction

## Introduction

In this blog post, we will explore the application of a quantum-inspired approach for rainfall prediction. We will compare the performance of a classical machine learning approach with a quantum-inspired approach using a feature mapping technique. The code and analysis discussed in this blog post are implemented using Python and scikit-learn library.

## Dataset Description

The dataset used for this experiment contains historical weather data and corresponding rainfall measurements. Each data point consists of several features such as temperature, humidity, wind speed, and cloud cover. The task is to predict the amount of rainfall based on these features.

## Classical Approach

We start by implementing a classical machine learning approach for rainfall prediction. The classical approach involves feature engineering, where we preprocess the dataset and extract relevant features. We then train a logistic regression model on the preprocessed data and evaluate its performance.

## Quantum-Inspired Approach

Next, we explore a quantum-inspired approach for rainfall prediction. The quantum-inspired approach utilizes a feature mapping technique based on quantum circuits. We define a quantum circuit for feature mapping, where we apply quantum gates to transform the input data. We then apply the feature mapping to the training and testing data and train a logistic regression model on the transformed data.

## Experimental Results

We compare the performance of the classical and quantum-inspired approaches using accuracy as the evaluation metric. The accuracy of the classical approach is found to be 0.465, while the accuracy of the quantum-inspired approach is slightly higher at 0.485.

## Conclusion

Based on the experimental results, we conclude that the quantum-inspired approach slightly outperforms the classical approach in terms of accuracy for rainfall prediction. However, further analysis and evaluation are required to understand the robustness and generalization capability of the models.

## Code

The code for implementing the classical and quantum-inspired approaches can be found in the following GitHub repository: <https://github.com/Nikhilpundir777/Quantum-ML>