INNOVATIVE ASSIGNMENT

Programming for Scientific Computing

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PUMPKIN SEED CLASSIFICATION

REQUIRED PACKAGES FOR PROJECTS :-

* K-NN
* SVM
* QUANTUM ML
* PCA

 K-nearest neighbor (KNN) :-

K-NN algorithm basically creates an imaginary boundary to classify the data. When new data points come in, the algorithm will try to predict that to the nearest of the boundary line.

Pumpkin seeds are frequently consumed as confection worldwide because of their adequate amount of protein, fat, carbohydrate, and mineral contents. This study was carried out on the two most important and quality types of pumpkin seeds, ‘‘Urgup\_Sivrisi’’ and ‘‘Cercevelik’’, generally grown in Urgup and Karacaoren regions in Turkey. However, morphological measurements of 2500 pumpkin seeds of both varieties were made possible by using the gray and binary forms of threshold techniques. Considering morphological features, all the data were modeled with five different machine learning methods: Logistic Regression (LR), Multilayer Perceptrons (MLP), Support Vector Machine (SVM) and Random Forest (RF), and k-Nearest Neighbor (k-NN), which further determined the most successful method for classifying pumpkin seed varieties. However, the performances of the models were determined with the help of the 10 kfold cross-validation method. The accuracy rates of the classifiers were obtained as LR 87.92 percent, MLP 88.52 percent, SVM 88.64 percent, RF 87.56 percent, and k-NN 87.64 percent

INSTALL :-

$pip install -U scikit-learn

$from sklearn.neighbors **import** KNeighborsClassifier

 QUANTUM ML:-

The Variational Quantum Classifier (VQC) is a quantum machine learning algorithm that uses quantum circuits to classify data. It is one of the most promising applications of quantum computing, as it has the potential to outperform classical machine learning algorithms for certain types of problems.

The VQC model works by encoding data into quantum states, and then using a parameterized quantum circuit to perform a series of quantum operations on the state. The parameters of the circuit are then optimized using classical optimization algorithms to minimize a cost function that measures the difference between the output of the quantum circuit and the target output.

The VQC model has been shown to be effective for a wide range of classification problems, including image recognition, text classification, and molecular classification. However, it is important to note that the VQC model is still in its early stages of development, and there are many challenges that need to be overcome before it can be widely adopted in practical applications. These challenges include improving the scalability and robustness of the algorithm, as well as developing better techniques for encoding data into quantum states.

 PCA :-

Principal Component Analysis (PCA) is a **linear dimensionality reduction** technique that can be utilized for extracting information from a high-dimensional space by projecting it into a lower-dimensional sub-space. It tries to preserve the essential parts that have more variation of the data and remove the non-essential parts with fewer variation

In Pumkin seed Classification we use PCA for the reducing the dimensions that there is no use of that so for that classification become efficient and effective.

INSTALL :-

$pip install pca

$from pca import pca