Artificial Neural networks

**Classification Using Artificial Neural Networks with Hyperparameter Tuning on Alphabets Data**

**Overview**

In this assignment, you will be tasked with developing a classification model using Artificial Neural Networks (ANNs) to classify data points from the "Alphabets\_data.csv" dataset into predefined categories of alphabets. This exercise aims to deepen your understanding of ANNs and the significant role hyperparameter tuning plays in enhancing model performance.

**Dataset: "Alphabets\_data.csv"**

The dataset provided, "Alphabets\_data.csv", consists of labeled data suitable for a classification task aimed at identifying different alphabets. Before using this data in your model, you'll need to preprocess it to ensure optimal performance.

**Tasks**

**1. Data Exploration and Preprocessing**

* Begin by loading and exploring the "Alphabets\_data.csv" dataset. Summarize its key features such as the number of samples, features, and classes.
* Execute necessary data preprocessing steps including data normalization, managing missing values.

**2. Model Implementation**

* Construct a basic ANN model using your chosen high-level neural network library. Ensure your model includes at least one hidden layer.
* Divide the dataset into training and test sets.
* Train your model on the training set and then use it to make predictions on the test set.

**3. Hyperparameter Tuning**

* Modify various hyperparameters, such as the number of hidden layers, neurons per hidden layer, activation functions, and learning rate, to observe their impact on model performance.
* Adopt a structured approach like grid search or random search for hyperparameter tuning, documenting your methodology thoroughly.

**4. Evaluation**

* Employ suitable metrics such as accuracy, precision, recall, and F1-score to evaluate your model's performance.
* Discuss the performance differences between the model with default hyperparameters and the tuned model, emphasizing the effects of hyperparameter tuning.

**Evaluation Criteria**

* Accuracy and completeness of the implementation.
* Proficiency in data preprocessing and model development.
* Systematic approach and thoroughness in hyperparameter tuning.
* Depth of evaluation and discussion.
* Overall quality of the report.

**Additional Resources**

* [TensorFlow Documentation](https://www.tensorflow.org/)
* [Keras Documentation](https://keras.io/)

We wish you the best of luck with this assignment. Enjoy exploring the fascinating world of neural networks and the power of hyperparameter tuning!