**The key details of AI Coding Challenge**

1. **Implementation Details:**
   * The project was implemented in Python using PyTorch in GPU mode.
2. **Model Architecture:**
   * You have two options for the CNN model. The first option is to select a pre-trained model, specifically ResNet-18. The second option is to use your custom CNN model.
3. **Testing Platform:**
   * The code was rigorously tested on the Kaggle platform, which provides free access to GPU resources, specifically GPU T4 x 2.
4. **Attached Notebook:**
   * You can access the comprehensive project details in the attached notebook, named "AI\_notebook\_Guangpin\_15102023.ipynb."
5. **Project Structure:**
   * The project can be divided into five main sections:

1. **Data Reading (class TumorDataset):**

This component reads the original tumor datasets and constructs a dataframe that contains the image paths and their corresponding labels for each image.

2. **Data Preprocessing and Transformation (class CustomDataset (Dataset)):**

This class handles data preprocessing and transformation, preparing the data for model training.

3. **Data Splitting:**

The dataset is split into train\_dataset, val\_dataset, and test\_dataset to ensure a robust evaluation of the model's performance.

4. **A Custom CNN Model(class TumorClassifier(nn.Module)):**

This class designs a custom CNN model for tumor classification.

5. **Model Training and Evaluation (class ModelTrainingEvaluation):**

This section outlines the design of the model architecture, the fine-tuning process of ResNet-18, and the evaluation of the final model.

1. **Guidance for Running the Notebook on Kaggle:**
   * To run the notebook on the Kaggle platform with GPU T4 x 2, please follow these steps:
   * 1. **Access the Notebook:** - Click on the following link: <https://www.kaggle.com/guangpin/ai-notebook-guangpin-16102023/edit> .

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* 2. **Login Credentials:** - Sign in using the following credentials:

- **Email:** [Guangpin.LI@btinternet.com](mailto:Guangpin.LI@btinternet.com)

- **Password:** Xiaohui\_72

* 3. Please ensure that the GPU T4 X 2 has been properly configured.

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* 4. Execute the notebook and assess the Validation Accuracy, Loss on the test set and review the Confusion Matrix for the Test set.
* Use a pre-trained model

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* Use the custom CNN model

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* The first option outperforms the second one marginally.

**Please feel free to contact me if you have any questions or need further information.**

Best regards,  
Guangpin

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