**Practical Exams for Freshers in Python and AI/ML**

This document outlines three practical exams tailored for freshers with knowledge in Python and AI/ML, aligned with the projects and experiences listed. Need to perform any one from below 3. It would be added more value if you had work on more then one.

**Exam 1: Python Programming and Basic Data Analysis**

**Objective:** Evaluate the candidate's proficiency in Python and their ability to perform basic data analysis.

**Problem Statement**

You are provided with a dataset containing sales records for a retail store. Perform the following tasks:

1. Load the dataset into a Pandas DataFrame and display the first 10 rows.
2. Clean the data by handling missing values and removing duplicates.
3. Calculate and display:
   * Total sales per product.
   * Total revenue per region.
   * The month with the highest sales.
4. Visualize:
   * Sales trends over time using Matplotlib or Seaborn.
   * The top 5 products by revenue as a bar chart.

**Deliverables:**

* A Python script or Jupyter Notebook with detailed comments.
* Data visualizations embedded in the notebook or script output.

**Exam 2: Machine Learning Project Implementation**

**Objective:** Assess the candidate's ability to apply ML techniques for predictive modeling.

**Problem Statement**

Build a predictive model for real estate price prediction using the provided dataset.

**Steps:**

1. Load the dataset and perform exploratory data analysis (EDA).
   * Identify key trends and insights.
   * Handle missing values, if any.
2. Preprocess the data:
   * Encode categorical variables.
   * Normalize or standardize features.
3. Train and test a machine learning model to predict house prices.
   * Compare at least three algorithms (e.g., Linear Regression, Decision Tree, Random Forest).
   * Use cross-validation for evaluation.
4. Evaluate the models using appropriate metrics (e.g., RMSE, MAE).
5. Optimize the best-performing model using hyperparameter tuning.

**Deliverables:**

* A detailed report explaining the steps taken.
* Python script or Jupyter Notebook with code and results.
* Insights and recommendations based on the findings.
* For data you can use following field
* columns = ['Property ID', 'Location', 'Size (sqft)', 'Bedrooms', 'Bathrooms', 'Year Built', 'Price ($)']

**Exam 3: AI/ML with Computer Vision**

**Objective:** Evaluate the candidate’s skills in computer vision using OpenCV and deep learning.

**Problem Statement**

Develop a license plate recognition system using OpenCV and Tesseract OCR.

**Steps:**

1. Use the provided dataset of vehicle images with license plates.
2. Preprocess the images:
   * Convert to grayscale.
   * Apply noise reduction and edge detection.
3. Detect the region of interest (ROI) containing the license plate using contour detection.
4. Extract text from the detected license plates using Tesseract OCR.
5. Evaluate the accuracy of the OCR system.

**Deliverables:**

* A Python script with step-by-step implementation.
* Visual output showing detected license plates and extracted text.
* A brief report on system performance and improvement suggestions.

**General Instructions:**

* All submissions should include proper documentation and comments.
* Each exam is designed to be completed within 4-6 hours.
* Use libraries such as Pandas, NumPy, Scikit-learn, TensorFlow/Keras, Matplotlib/Seaborn, OpenCV, and Tesseract as needed.

**Evaluation Criteria:**

* Code quality and readability.
* Ability to explain findings and decisions.