Question: Bootcamp

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Note 1: The students of web development will answer 1-6. Others can be bonus but not mandatory
Note 2: The students of NLP will answer 1-4 & 7. Others can be bonus but not mandatory
Note 3: The students of Computer Vision will answer 1-4 & 8. Others can be bonus but not mandatory
Note 4: The students of SQA will answer 9.

Submission Process: It's a implementation based exam. Please solve and send your github code at innovativeskillsbd@gmail.com. Please don't use fully gpt code. Use your creativity. We have ai tools to detect your code status. Deadline: 19th February.

1) A banking application allows users to withdraw money. The function `withdraw(balance, amount)` should check if the withdrawal amount is greater than the balance. If yes, it should raise an exception `"Insufficient funds"`, otherwise return the new balance.
2) You are building a calculator app. Write a Python function `calculate()` that takes two numbers and an operator (`+`, `-`, `*`, `/`) as input and returns the result.
3) A teacher maintains a list of students in a class. The list is `["Alice", "Bob", "Charlie", "David", "Eve"]`. Write a Python program to print the names of students whose names start with "A" or "D".
4) A university has a `Person` class with a method `introduce()` that prints `"I am a person."` A subclass `Student` overrides this method to print `"I am a student."` Write the Python code demonstrating this behavior.
5) A university wants to create a database system to manage its students, courses, and instructors. The system must store the following information:
    - Students have a Student_ID, Name, Email, Phone, and Date_of_Birth.
    - Courses have a Course_ID, Course_Name, Credits, and Department.
    - Instructors have an Instructor_ID, Name, Email, and Office_Room.
    - Each student can enroll in multiple courses, and each course can have multiple students.
    - Each course is taught by exactly one instructor, but an instructor can teach multiple courses.

    Question:

    - Identify the entities and their attributes from the scenario.
    - Define the relationships between the entities (one-to-many, many-to-many, etc.).
    - Draw an ERD (on paper or using a tool like Draw.io) representing this system.
    - Specify the primary keys (PK) and foreign keys (FK) for each table.
6) A company wants to develop an authentication system where users can **register**, **log in**, and get a **JWT token** to access protected resources.Implement a FastAPI & DRF authentication system using **JWT tokens**.

7. You are using Sentiment140 to train a sentiment classifier with traditional ML models (Logistic Regression, SVM).
    - What preprocessing steps are necessary before feeding the data into an ML model?
    - How would you convert tweets into numerical representations (TF-IDF, CountVectorizer, Word2Vec)?
    - What **sampling techniques** (Oversampling, Undersampling, SMOTE) would you use to improve performance?
    - Which metrics (Accuracy, Precision, Recall, F1-score, AUC-ROC) should be used to evaluate a sentiment classifier, and why?
    - You are training a **Random Forest** model for sentiment classification.
    - Which **hyperparameters** are crucial, and how would you optimize them using GridSearchCV or RandomizedSearchCV
    - How does each architecture handle CNN & LSTM sequential text data?

    - Which one would you choose for **short tweets vs long text reviews**, and why? How does **BERT handle contextual word meanings** compared to Word2Vec or TF-IDF?

    - What modifications (fine-tuning, freezing layers) would improve sentiment classification performance?What are the key steps for fine-tuning an **LLM on a sentiment dataset**?

8. Please check the below question:

    - Which **open-source datasets** (COCO, ImageNet, OpenImages, etc.) are best suited for object classification tasks?
    - How would you handle **class imbalance** in an open-source dataset?
    - Which **pretrained models** (ResNet, MobileNet, EfficientNet) are best for object classification?

9. Please check the below question:

    - Please submit a testing report for this site - https://signorchoice.com/