Coding Test: Prisoner Data Analysis and Visualization

You are required to develop a Python application that processes prisoner data, provides a REST API for accessing the data, and displays the data as interactive charts in a web browser. This project encompasses data processing, API development, front-end integration, and adherence to security best practices, culminating in a comprehensive and interactive prisoner data management system. As a part of assessment, we are particularly interested in understanding you approach to solving this problem and why you opted to use one way over another to achieve your task. We would also evaluate how you would present this exercise to us during the interview.

Schema Overview

You will use a sample dataset (provided in **section 6**) containing prisoner information, you can use any open source database to host the data. Each record contains:

- **prisoner_id**: Unique identifier for the prisoner
- **name**: Name of the prisoner
- **age**: Age of the prisoner
- **gender**: Gender of the prisoner
- **crime**: Type of crime committed.
- **sentence_years**: Length of the sentence in years.
- **prison**: Name of the prison

Exercise Requirements

1. **Data Processing and Analysis:**

    - Load and manipulate the prisoner dataset using Pandas(any other is also fine).
    - Perform basic data analysis to extract insights, such as the number of prisoners by crime type, average sentence length, and gender distribution.

2. **API Development**:

    - Develop a REST API using any of (Flask, Fast API, Django) to provide endpoints for accessing the processed data.
    - Implement the following endpoints:
        - **/api/prisoners**: Returns a list of all prisoners.
        - **/api/prisoners/<prisoner_id>**: Returns details of a specific prisoner.
        - **/api/analysis**: Returns summary statistics and insights from the data analysis.

3. **Front-End Development**:

- Create a simple web page using HTML and JavaScript to interact with the API.
- Use a JavaScript library like Chart.js(or any other way) to display interactive charts based on the data received from the API.
- Display at least three different charts, such as:
    - Number of prisoners by crime type.
    - Average sentence length by crime type.
    - Gender distribution of prisoners.
    - Feel free to add more scenarios if you wish

4. **Security and Best Practices**:

- Ensure the application follows best security practices to safeguard sensitive data.
- Include appropriate error handling and validation.

5. **Deployment**

- Utilize a database, such as MYSQL, to store the data in a structured table format, including its metadata. It will be essential to showcase the database and its structure in your presentation.
- Implementing automation through Jenkins or Github actions would be considered a **stretch goal** and would not be scored for the test's purposes, although it's encouraged if you can either implement this or explain how it could be automated.

Please provide your presentation and code via a GitHub repository 24hours before the interview. A **README.md** with instructions on how to run the application.

During the interview, you'll need to conduct a screen-sharing session to explain your project and demonstrate its functionality.

6. **Sample Dataset**

You may generate your own dataset for this task, but a sample CSV file is provided below for reference. **Please note that the data provide below is simulated data!**

```
prisoner_id,name,age,gender,crime,sentence_years,prison
1,John Doe,34,M,Murder,25,Barnard Castle
2,Jane Smith,29,F,Theft,5,Edinburgh
3,Bob Johnson,42,M,Fraud,10,Glasgow
4,Alice Brown,30,F,Assault,3,Inverness
5,Tom White,22,M,Drug Possession,2,Dumfries
6,Mary Black,45,F,Theft,6,Edinburgh
7,James Green,37,M,Assault,8,Glasgow
8,Patricia Miller,28,F,Fraud,7,Inverness
9,Robert Wilson,33,M,Drug Trafficking,15,Dumfries
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10,Linda Davis,41,F,Murder,20,Barnard Castle
11,Michael Brown,38,M,Theft,4,Edinburgh
12,Sarah Johnson,27,F,Assault,2,Glasgow
13,David Lee,36,M,Drug Trafficking,12,Dumfries
14,Laura Martin,32,F,Fraud,5,Inverness
15,Chris Evans,29,M,Theft,3,Edinburgh
16,Jessica Taylor,40,F,Murder,18,Barnard Castle
17,Andrew Walker,31,M,Fraud,9,Glasgow
18,Karen Scott,26,F,Drug Possession,1,Dumfries
19,Brian Harris,44,M,Assault,6,Inverness
20,Emily White,35,F,Theft,2,Edinburgh
21,Jason Moore,39,M,Drug Trafficking,14,Barnard Castle
22,Rebecca King,33,F,Assault,4,Glasgow
23,Daniel Wright,28,M,Drug Possession,3,Dumfries
24,Amy Clark,31,F,Fraud,8,Inverness
25,Richard Lewis,37,M,Murder,22,Edinburgh
26,Laura Hall,30,F,Theft,5,Glasgow
27,George Allen,43,M,Assault,10,Dumfries
28,Susan Young,29,F,Fraud,6,Inverness
29,Mark Hernandez,34,M,Drug Trafficking,13,Barnard Castle
30,Elizabeth Lopez,38,F,Murder,19,Edinburgh
31,Thomas Hill,36,M,Theft,4,Glasgow
32,Margaret Nelson,27,F,Assault,3,Inverness
33,Charles Carter,41,M,Drug Possession,2,Dumfries
34,Emily Mitchell,45,F,Fraud,7,Edinburgh
35,Matthew Martinez,32,M,Murder,21,Barnard Castle
36,Ashley Adams,29,F,Theft,4,Glasgow
37,Steven Baker,33,M,Assault,5,Inverness
38,Megan Rivera,40,F,Fraud,8,Dumfries
39,Kevin Phillips,37,M,Drug Trafficking,16,Edinburgh
40,Karen Roberts,28,F,Murder,23,Barnard Castle
41,Ronald Campbell,34,M,Theft,6,Glasgow
42,Angela Murphy,31,F,Assault,2,Inverness
43,Ryan Gonzalez,26,M,Drug Possession,3,Dumfries
44,Shirley Sanchez,39,F,Fraud,9,Edinburgh
45,Paul Simmons,43,M,Murder,24,Barnard Castle
46,Nancy Stewart,29,F,Theft,5,Glasgow
47,Samuel Powell,32,M,Assault,6,Inverness
48,Jessica Patterson,41,F,Fraud,7,Dumfries
49,Gregory Collins,36,M,Drug Trafficking,17,Edinburgh
50,Patricia Hughes,30,F,Murder,20,Barnard Castle