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2025 USA-NA-AIO Round 1, Problem 3, Part 1

USAAIO Mar 2025

Problem 3 (100 points)

Before starting this problem, make sure to run the following code first **without any change**:

```
# DO NOT CHANGE

import numpy as np

import pandas as pd

import copy

import matplotlib.pyplot as plt

from sklearn.preprocessing import StandardScaler

np.random.seed(2025)

""" END OF THIS PART """
```

WARNING !!!

- Beyond importing libraries/modules/classes/functions in the preceeding cell, you are **NOT allowed to import anything else for the following purposes**:
  - **As a part of your final solution.** For instance, if a problem asks you to build a model without using sklearn but you use it, then you will not earn points.
  - **Temporarily import something to assist you to get a solution.** For instance, if a problem asks you to manually compute eigenvalues but you temporarily use

`np.linalg.eig` to get an answer and then delete your code, then you violate the rule.

Rule of thumb: Each part has its particular purpose to intentionally test you something. Do not attempt to find a shortcut to circumvent the rule.

- All coding tasks shall run on CPUs, **not GPUs**.

Part 1 (5 points, coding task)

We study the dataset `USAAIO_2025_round1_prob3_train.csv` provided in this contest.

The dataset can be found here:

```
url = "https://drive.google.com/file/d/125YsFPS2nCNRvYyy1tgnD8RhYIUglLX9/view?usp
```

Do the following tasks in this part.

1. Load `USAAIO_2025_round1_prob3_train.csv` into a pandas DataFrame object called `df_1`.
2. Print the first 10 rows.
3. Define a function called `data_summary` that
   - Takes a DataFrame object as an input.
   - Prints the shape of the DataFrame.
   - Prints the data type for each column.
   - Prints the count of missing values for each column.
   - Delivers no output.

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4. After defining the above function, call it by feeding `df_1` to it.

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