EDA Board

1. Problem Analysis

Exploratory Data Analysis (EDA) board to streamline and expedite the often repetitive and time-consuming process of data exploration during data analysis. The objective is to create a basic online platform that significantly reduces the time required for EDA tasks.

Key functionalities of the EDA board include:

- **Identification of Dataset Characteristics:**
  - Extraction of the number of features and columns within the dataset.
  - Identification and visualization of columns containing missing values through a bar graph displaying the percentage of missing values.
- **Datatype Analysis:**
  - Categorization of data into continuous and categorical values.
  - Visual representation of data distribution using a pie chart.
- **Dataset Description:**
  - Description of dataset to provide users with a better understanding of the dataset.
- **Graphical Representations:**
  - Visualizations of the dataset, including:
    - Bar graphs illustrating missing values distribution.
    - Pie chart depicting the proportion of categorical and continuous values.
    - Histograms for a clear visualization of data distributions.
    - Count plot highlighting the distribution of the target variable.
    - Heatmap/Correlation matrix to get the inter-feature relationships.
    - Feature correlation analysis with the dependent variable.

2. Business Requirements
    a. **Efficiency:** Streamline and speed up data exploration during analysis using EDA Board
    b. **Automation:** Create a platform that significantly reduces the time required for Exploratory Data Analysis (EDA) tasks.
    c. **Comprehensiveness:** Provide a range of functionalities covering dataset characteristics identification, data type analysis, dataset description, and graphical representations.
    d. **User-Friendly Interface:** Design an intuitive online platform for ease of use.
    e. **Visualization:** Enable graphical representations to enhance understanding and interpretation of data based on user entered features and display graphs based on different visualizations like pie chart, bar graph, histograms, count plot, heatmap, correlation matrix.
    f. **Insight Generation:** Facilitate the identification of dataset characteristics, missing values, data distributions and correlations to target variable.

    Nouns

    Verbs

3. Collection of Nouns and Verbs
    a. **Nouns:** EDA board, dataset, visualization, description.
    b. **Verbs:** Features, missing values, data types, pie chart, bar graph, histograms, count plot, heatmap, correlation matrix, dataset characteristics, data distribution, target variable.

4. Aggregation of nouns and verbs by topic (Classes with their attributes)

    Classes:

    - EDABoard
    - Dataset
    - Visualization
    - Description

    Attributes:
    - Dataset: features, missing values, data types
    - Visualization: pie chart, bar graph, histograms, count plot, heatmap, correlation matrix
    - Description: dataset characteristics, data distribution, target variable

    Associations:
    - EDABoard has a Dataset.
    - Dataset contains Features and Columns.
    - Visualization represents data distribution and correlations.
    - Description provides insights into dataset characteristics and distributions.

5. Target Audience

- **Students and Educators:** Students studying data science, statistics, or related fields, and educators teaching data analysis courses. They need accessible tools for hands-on learning and teaching exploratory data analysis concepts.
- **Data Analysts:** Professionals responsible for analyzing datasets to derive insights and make data-driven decisions. They require tools that streamline the process of exploring and understanding datasets efficiently.
- **Business Analysts:** Professionals in business roles who analyze data to identify trends, make forecasts, and support strategic decision-making. They require user-friendly tools to explore datasets and communicate insights effectively.

6. Rules
    a. The platform must accurately identify and visualize dataset characteristics.
    b. It should categorize data into continuous and categorical values effectively.
    c. The graphical representations should be clear and intuitive for easy interpretation.
    d. Dataset description must provide sufficient context for users to understand the dataset.
    e. Feature correlation analysis should be accurate to help users derive insights.
    f. The platform should be user-friendly and accessible online.

7. Challenge questions
    - How can we ensure the accuracy of feature correlation analysis with the dependent variable?
    - What measures should be taken to handle large datasets efficiently?
    - What visualization techniques can be employed to represent complex data distributions effectively?
    - How do we ensure the platform remains user-friendly while incorporating advanced analytical functionalities?

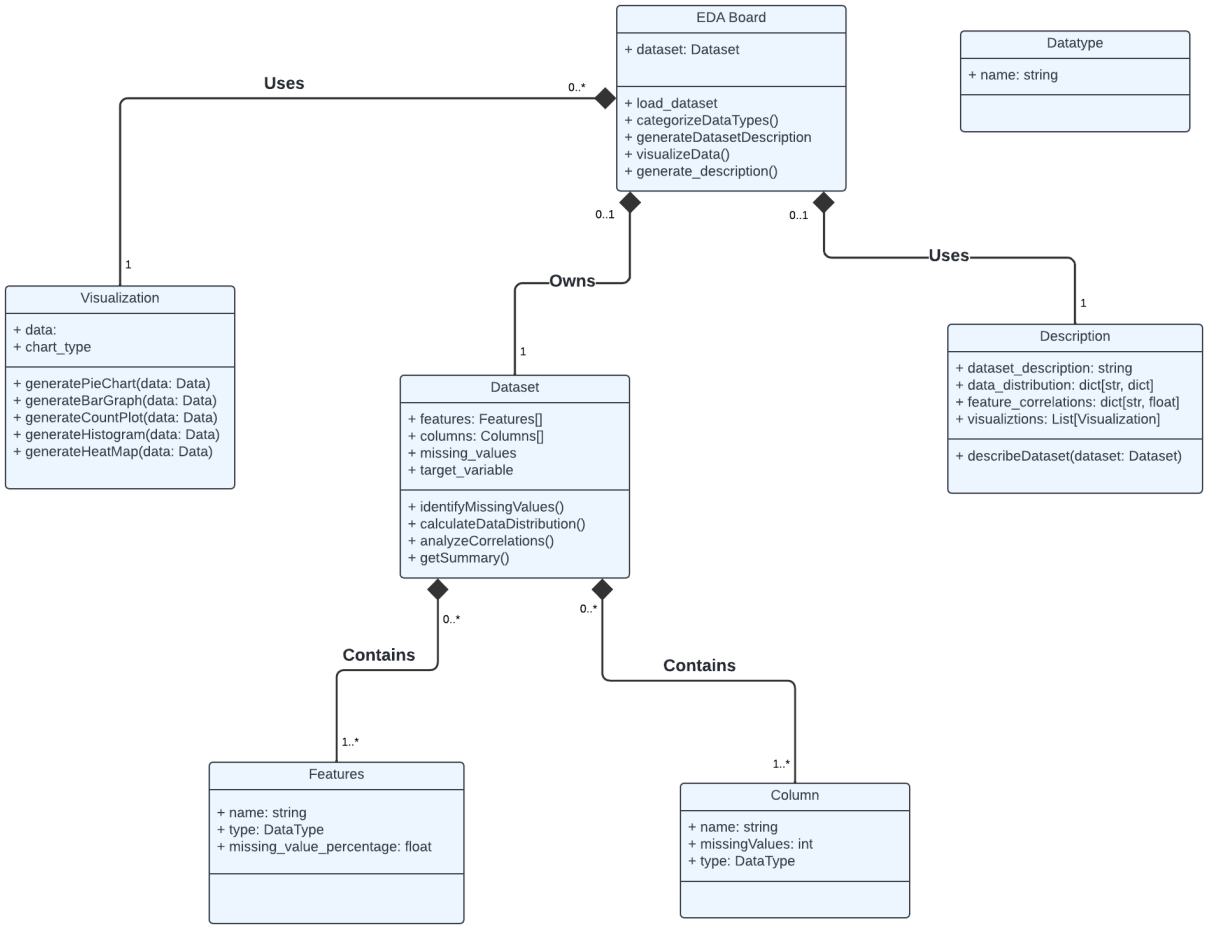
8. User stories
    a. Defining user personas (target users)
        i. Students
            - As a student like Sam, I want to utilize the EDA platform to analyze datasets for academic projects or research purposes efficiently, considering factors like dataset characteristics, data types, and correlations.
        ii. Data Analysts
            - As a data analyst like Mike, I want to utilize the EDA platform to analyze datasets for various projects or tasks efficiently, focusing on factors like dataset characteristics, data types, and correlations to derive meaningful insights.
        iii. Business Analysts
            - As a business analyst like Dan, I want to leverage the EDA platform to explore datasets related to market trends or consumer behavior, using visualizations like histograms and pie charts to identify patterns and inform business strategies.
        iv. Educators:
            - As an educator like Karen, I want to use the EDA platform to teach students about data analysis concepts effectively, providing hands-on experience with datasets and visualizations to enhance their learning and understanding.

b. User persona dimensions
    i. Technical Vs Non-technical
    ii. Programmer vs non-programmers
    iii. Employed vs unemployed
    iv. Highly educated vs no formal education
    v. Knowledge about Data visualization vs No knowledge about Data Visualization
    vi. Experience with EDA vs No experience with EDA
c. Ranking the dimensions
    i. Experience with EDA vs No experience with EDA
    ii. Knowledge about Data visualization vs No knowledge about Data visualization

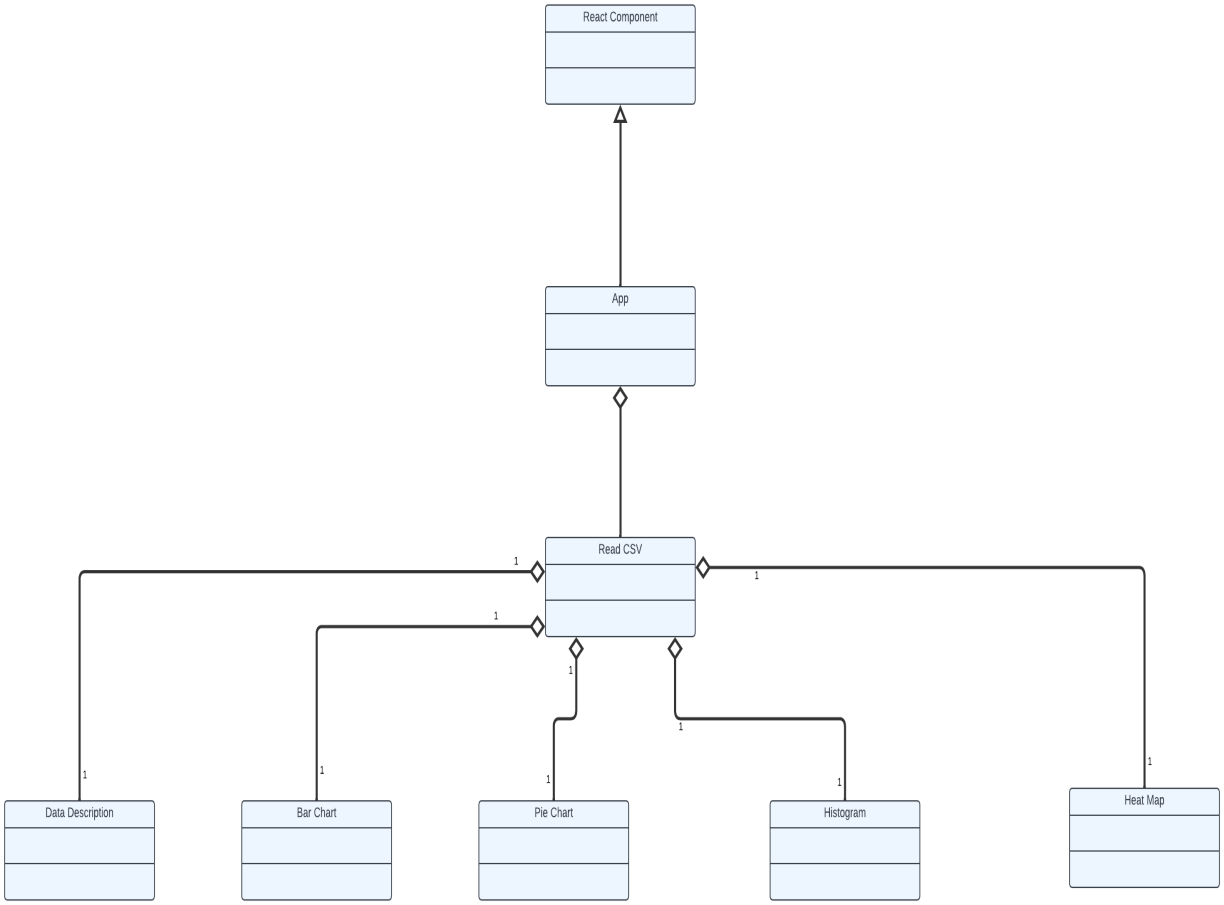
d. Identify user personas (diagram)

9. UML Diagram
    - **EDABoard**: Represents the main controller class responsible for coordinating different functionalities.
    - **Dataset**: Represents the dataset being analyzed, containing features and columns.
    - **Feature** and **Column**: Represent individual features and columns in the dataset, including their characteristics such as name and data type.
    - **Visualization**: Handles the generation of various graphical representations like pie charts, bar graphs, histograms, etc.
    - **Description**: Provides methods to generate descriptive information about the dataset.
    - **Datatype**: Represents the data types that can be assigned to features and columns.
    - **Data**: Represents the data used for visualization and description.

Model:



VC:


React Component
App
Read CSV
Data Description
Bar Chart
Pie Chart
Histogram
Heat Map
1
1
1
1
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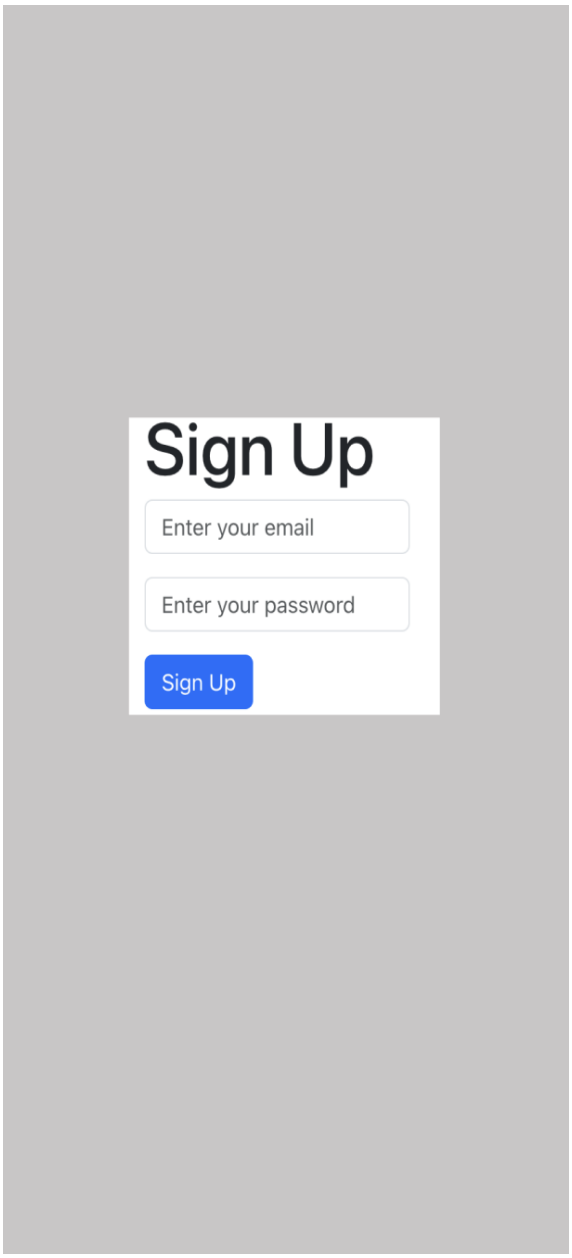
1
1
1

10. Low level mockups:

Link to Mockup: https://www.figma.com/file/tIFJYLlh2gmCJEQnfqkYNm/EDA-Board?type=design&node-id=19%3A521&mode=design&t=lkimlAJB37vg3si2-1

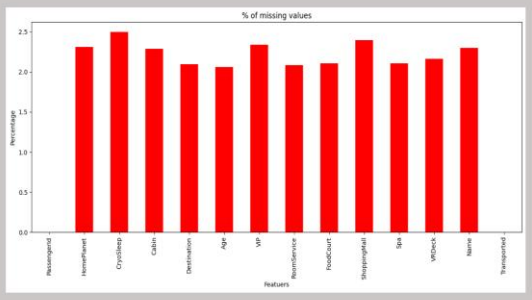
Frame 1:



Frame 2:

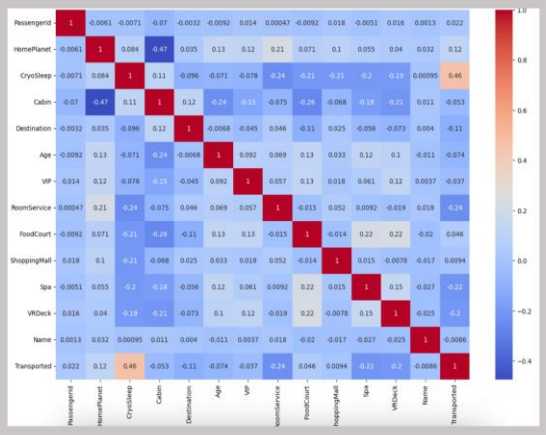
Frame 3:

	gameorder	_iscopy	year_id	seasongame	is_playoffs	pts	elo_i	elo_n	win_equiv	opp_pts	opp_elo_i	opp_elo_n	forecast
count	126314.00	126314.0	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00
mean	31579.00	0.5	1988.20	43.53	0.06	102.73	1495.24	1495.24	41.71	102.73	1495.24	1495.24	0.50
std	18231.93	0.5	17.58	25.38	0.24	14.81	112.14	112.46	10.63	14.81	112.14	112.46	0.22
min	1.00	0.0	1947.00	1.00	0.00	0.00	1091.64	1085.77	10.15	0.00	1091.64	1085.77	0.02
25%	15790.00	0.0	1975.00	22.00	0.00	93.00	1417.24	1416.99	34.10	93.00	1417.24	1416.99	0.33
50%	31579.00	0.5	1990.00	43.00	0.00	103.00	1500.95	1500.95	42.11	103.00	1500.95	1500.95	0.50
75%	47368.00	1.0	2003.00	65.00	0.00	112.00	1576.06	1576.29	49.64	112.00	1576.06	1576.29	0.67
max	63157.00	1.0	2015.00	108.00	1.00	186.00	1853.10	1853.10	71.11	186.00	1853.10	1853.10	0.98



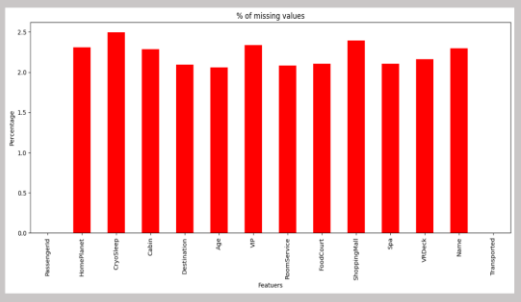
Select Graph

Select Occupation



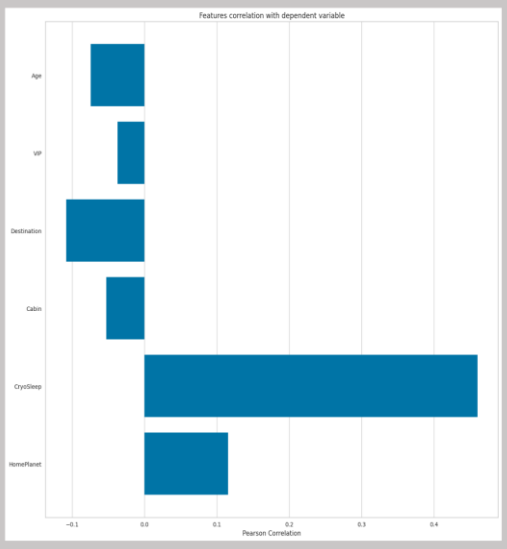
Frame 4:

	gameorder	_iscopy	year_id	seasongame	is_playoffs	pts	elo_i	elo_n	win_equiv	opp_pts	opp_elo_i	opp_elo_n	forecast
count	126314.00	126314.0	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00	126314.00
mean	31579.00	0.5	1988.20	43.53	0.06	102.73	1495.24	1495.24	41.71	102.73	1495.24	1495.24	0.50
std	18231.93	0.5	17.58	25.38	0.24	14.81	112.14	112.46	10.63	14.81	112.14	112.46	0.22
min	1.00	0.0	1947.00	1.00	0.00	0.00	1091.64	1085.77	10.15	0.00	1091.64	1085.77	0.02
25%	15790.00	0.0	1975.00	22.00	0.00	93.00	1417.24	1416.99	34.10	93.00	1417.24	1416.99	0.33
50%	31579.00	0.5	1990.00	43.00	0.00	103.00	1500.95	1500.95	42.11	103.00	1500.95	1500.95	0.50
75%	47368.00	1.0	2003.00	65.00	0.00	112.00	1576.06	1576.29	49.64	112.00	1576.06	1576.29	0.67
max	63157.00	1.0	2015.00	108.00	1.00	186.00	1853.10	1853.10	71.11	186.00	1853.10	1853.10	0.98



Select Graph

Select Occupation



Notes:

- The initial screen will only have the choose file button.
- Once the user upload a csv file of the dataset the initial analysis will be performed.
- After the initial analysis the the result as seen in Frame 1 will be displayed.
- The user also has the option to select various different graphs from the drop down menu.
- Once the user selects a graphs a dialog box will be displayed as shown in Frame 2.
- Based on the graph selected by the user the dialog box will show features to select for the particular graph.
- Once the user selects the features and clicks add the an interactive graph will be displayed as shown in Frame 3 and Frame 4.