# Data Collection and Preprocessing Phase

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| Date | 15 July 2024 |
| Team ID | 740685 |
| Project Title | **SDSS galaxy classification using Machine Learning** |
| Maximum Marks | 6 Marks |

**Data Exploration and Preprocessing Template**

Exploration and Preprocessing Template for SDSS galaxy classification for Machine Learning: Load data, handle missing values, explore basic statistics, visualize distributions, encode categorical variables, normalize/scale features, identify outliers, and prepare for modeling

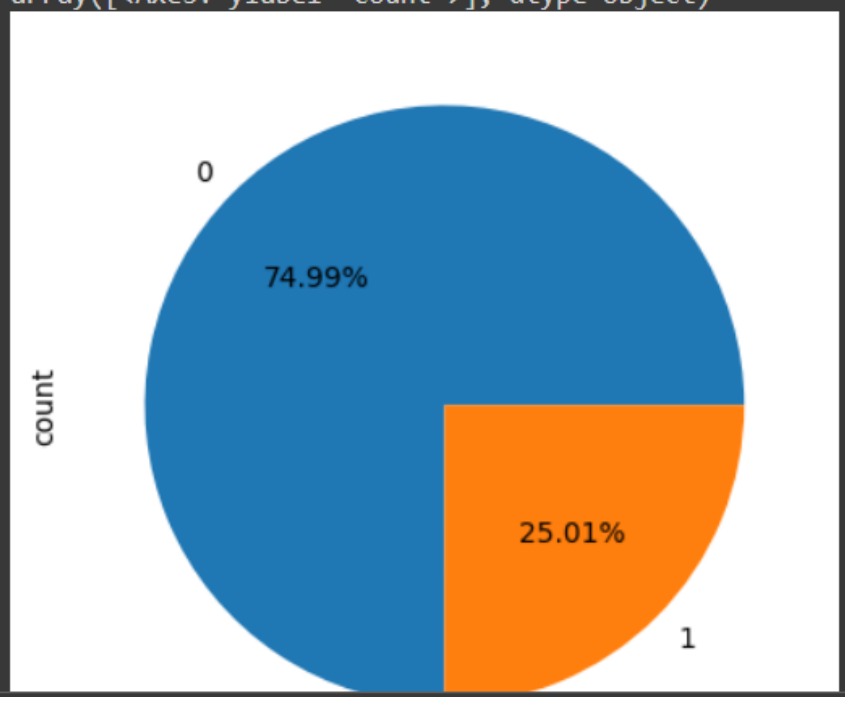
| **Section** | **Description** |
|---|---|
| Data Overview | Summary of the dataset, including number of rows and columns, data types of each column, and brief descriptions of each column. |
| Univariate Analysis | Distribution analysis of individual variables using histograms, bar charts, and descriptive statistics (mean, median, mode, standard deviation).<br>**#Univariate Analysis** |

```
[ ] sub = df["subclass"].value_counts()
    sub
```

```
subclass
0    74993
1    25007
Name: count, dtype: int64
```

```
[ ] sub.plot(kind="pie",subplots=True,autopct="%1.2f%%")
```

```
array([<Axes: ylabel='count'>], dtype=object)
```

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|---|---|
| Bivariate Analysis | Examination of relationships between pairs of variables using scatter plots, correlation matrices, and pairwise plots to identify patterns and trends.<br>#**Bivariate Analysis** |

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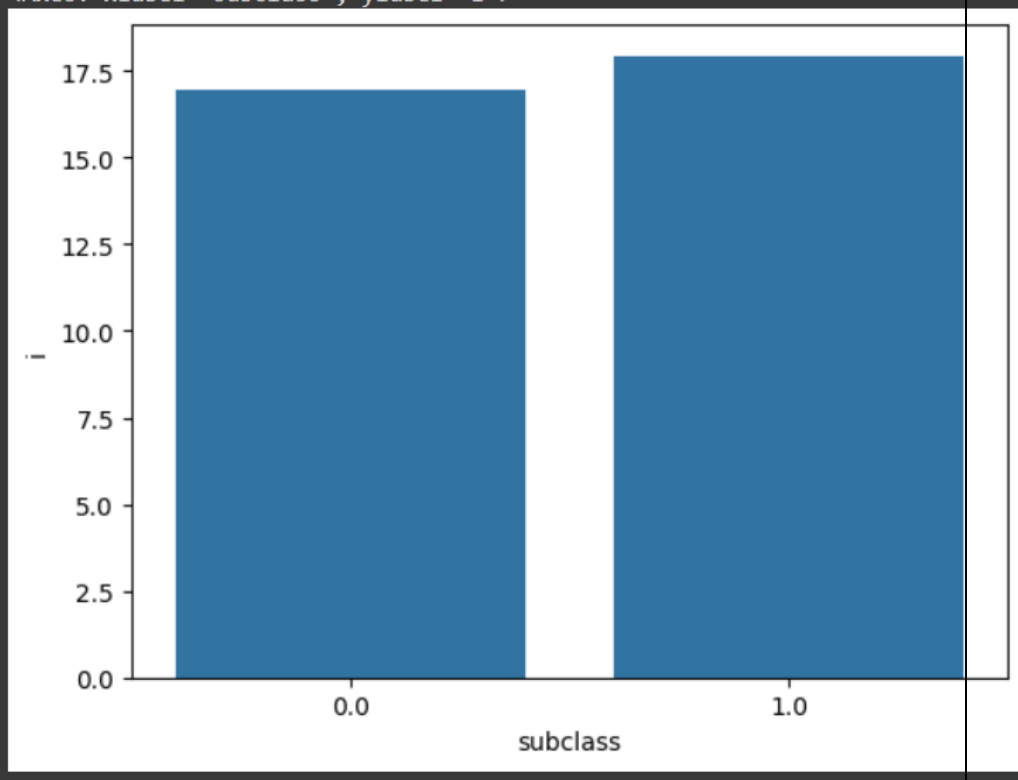
| | BIVARIATE ANALYSIS<br>[ ] `sns.barplot(x='subclass',y='i',data=df)`<br>`<Axes: xlabel='subclass', ylabel='i'>`<br>  <br> |
| Multivariate Analysis | Investigation of interactions between multiple variables using heatmaps, PCA (Principal Component Analysis), and clustering to understand data structure.<br>MULTIVARIATE ANALYSIS<br>[ ] `plt.figure(figsize=(10,6))`<br>`sns.heatmap(df.corr(),annot=True)`<br>`plt.show()` |

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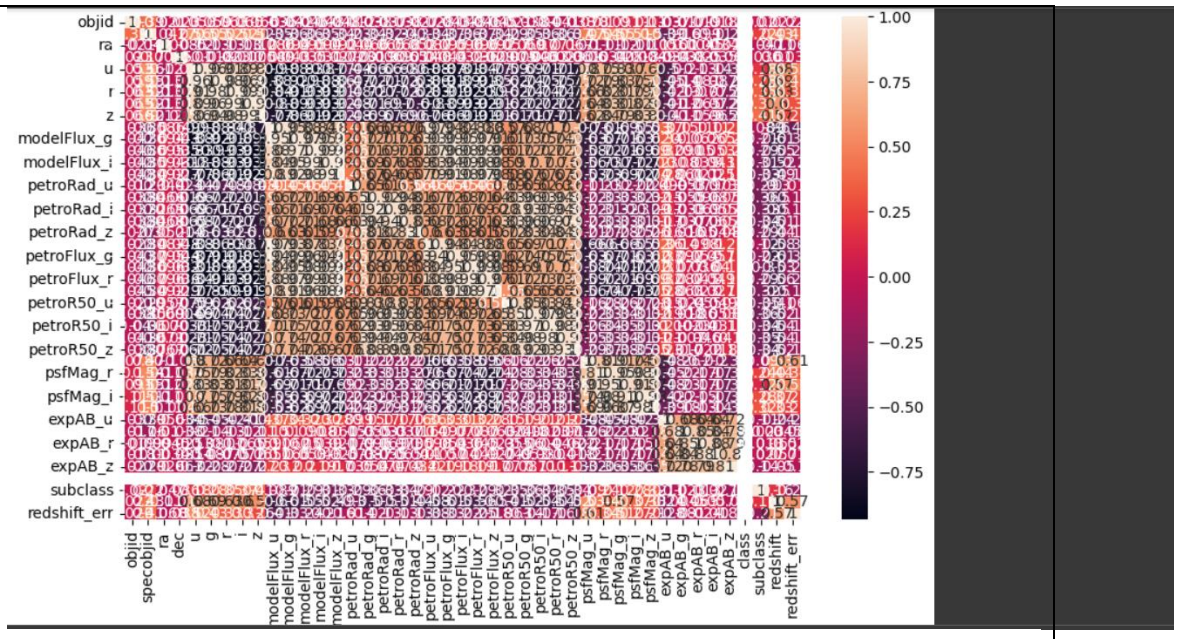
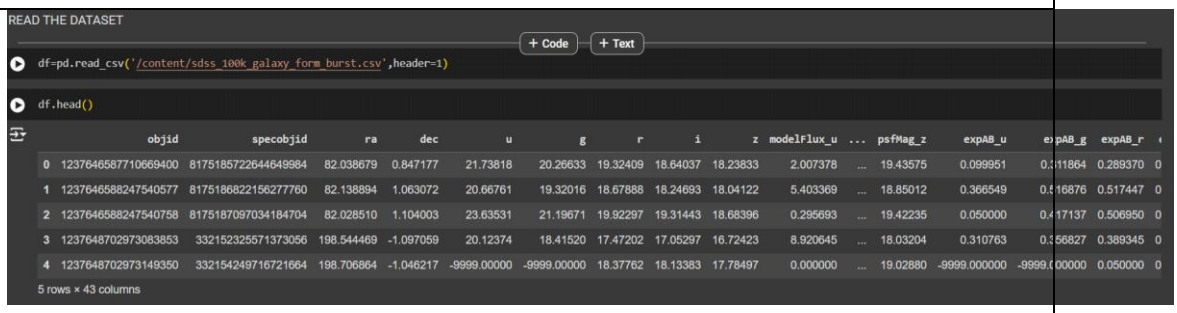
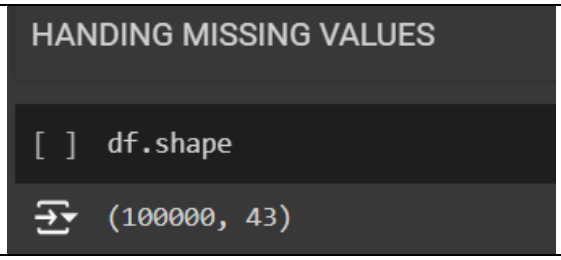
|---|---|
| |  |
| Outliers and Anomalies | Identification and description of outliers and anomalies, summarized in a table with details on detection method, number of outliers, description, and potential impact. |

**Data Preprocessing Code Screenshots**

| | |
|---|---|
| Loading Data |  |
| Handling Missing Data |  |

READ THE DATASET

+ Code + Text

```
df=pd.read_csv('/content/sdss_100k_galaxy_form_burst.csv',header=1)
```

```
df.head()
```

| | objid | specobjid | ra | dec | u | g | r | i | z | modelFlux_u | ... | psfMag_z | expAB_u | expAB_g | expAB_r |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1237646587710669400 | 8175185722644649984 | 82.038679 | 0.847177 | 21.73818 | 20.26633 | 19.32409 | 18.64037 | 18.23833 | 2.007378 | ... | 19.43575 | 0.099951 | 0.311864 | 0.289370 |
| 1 | 1237646588247540577 | 8175186822156277760 | 82.138894 | 1.063072 | 20.66761 | 19.32016 | 18.67888 | 18.24693 | 18.04122 | 5.403369 | ... | 18.85012 | 0.366549 | 0.516876 | 0.517447 |
| 2 | 1237646588247540758 | 8175187097034184704 | 82.028510 | 1.104003 | 23.63531 | 21.19671 | 19.92297 | 19.31443 | 18.68396 | 0.295693 | ... | 19.42235 | 0.050000 | 0.417137 | 0.506950 |
| 3 | 1237648702973083853 | 3321523255713730 56 | 198.544469 | -1.097059 | 20.12374 | 18.41520 | 17.47202 | 17.05297 | 16.72423 | 8.920645 | ... | 18.03204 | 0.310763 | 0.356827 | 0.389345 |
| 4 | 1237648702973149350 | 3321542497167216 64 | 198.706864 | -1.046217 | -9999.00000 | -9999.00000 | 18.37762 | 18.13383 | 17.78497 | 0.000000 | ... | 19.02880 | -9999.000000 | -9999.000000 | 0.050000 |

5 rows × 43 columns

HANDING MISSING VALUES

```
[ ] df.shape
```

```
(100000, 43)
```

```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100000 entries, 0 to 99999
Data columns (total 43 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   objid         100000 non-null  int64
 1   specobjid     100000 non-null  uint64
 2   ra            100000 non-null  float64
 3   dec           100000 non-null  float64
 4   u             100000 non-null  float64
 5   g             100000 non-null  float64
 6   r             100000 non-null  float64
 7   i             100000 non-null  float64
 8   z             100000 non-null  float64
 9   modelFlux_u   100000 non-null  float64
 10  modelFlux_g   100000 non-null  float64
 11  modelFlux_r   100000 non-null  float64
 12  modelFlux_i   100000 non-null  float64
 13  modelFlux_z   100000 non-null  float64
 14  petroRad_u    100000 non-null  float64
 15  petroRad_g    100000 non-null  float64
 16  petroRad_i    100000 non-null  float64
 17  petroRad_r    100000 non-null  float64
 18  petroRad_z    100000 non-null  float64
```

| | |
|---|---|
| | 19 petroFlux_u 100000 non-null float64<br>20 petroFlux_g 100000 non-null float64<br>21 petroFlux_i 100000 non-null float64<br>22 petroFlux_r 100000 non-null float64<br>23 petroFlux_z 100000 non-null float64<br>24 petroR50_u 100000 non-null float64<br>25 petroR50_g 100000 non-null float64<br>26 petroR50_i 100000 non-null float64<br>27 petroR50_r 100000 non-null float64<br>28 petroR50_z 100000 non-null float64<br>29 psfMag_u 100000 non-null float64<br>30 psfMag_r 100000 non-null float64<br>31 psfMag_g 100000 non-null float64<br>32 psfMag_i 100000 non-null float64<br>33 psfMag_z 100000 non-null float64<br>34 expAB_u 100000 non-null float64<br>35 expAB_g 100000 non-null float64<br>36 expAB_r 100000 non-null float64<br>37 expAB_i 100000 non-null float64<br>38 expAB_z 100000 non-null float64<br>39 class 100000 non-null object<br>40 subclass 100000 non-null object<br>41 redshift 100000 non-null float64<br>42 redshift_err 100000 non-null float64<br>dtypes: float64(39), int64(1), object(2), uint64(1)<br>memory usage: 32.8+ MB<br><br>For checking the null values, . isnull() function is used. To sum those null values we use . sum() function. From the above image we found that there are no null values present in our dataset. So we can skip handling the missing values step. |
| Data Transformation | - |
| Feature Engineering | - |
| Save Processed Data | - |