Exploratory Data Analysis

Digital Transformation of Healthcare

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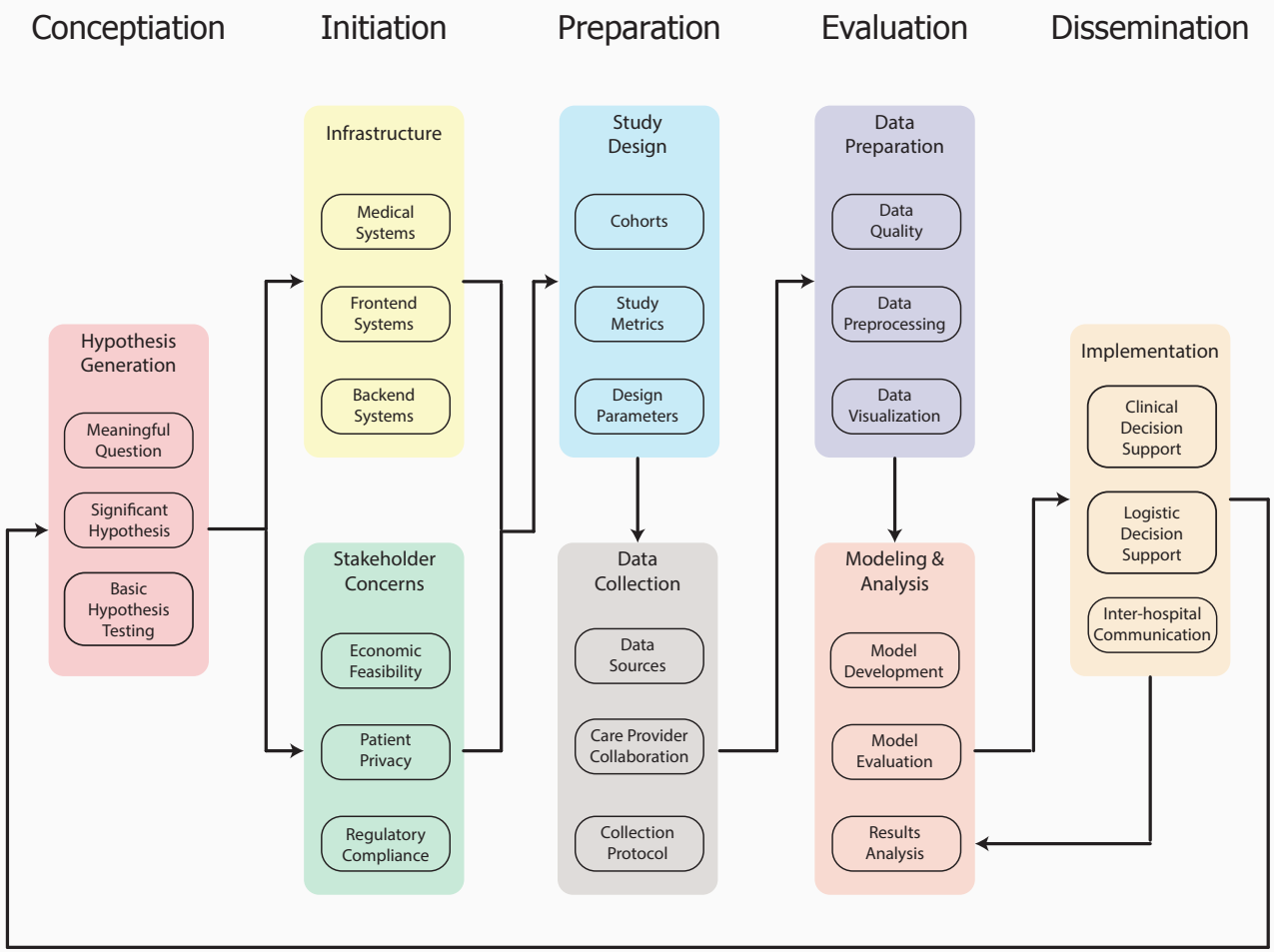
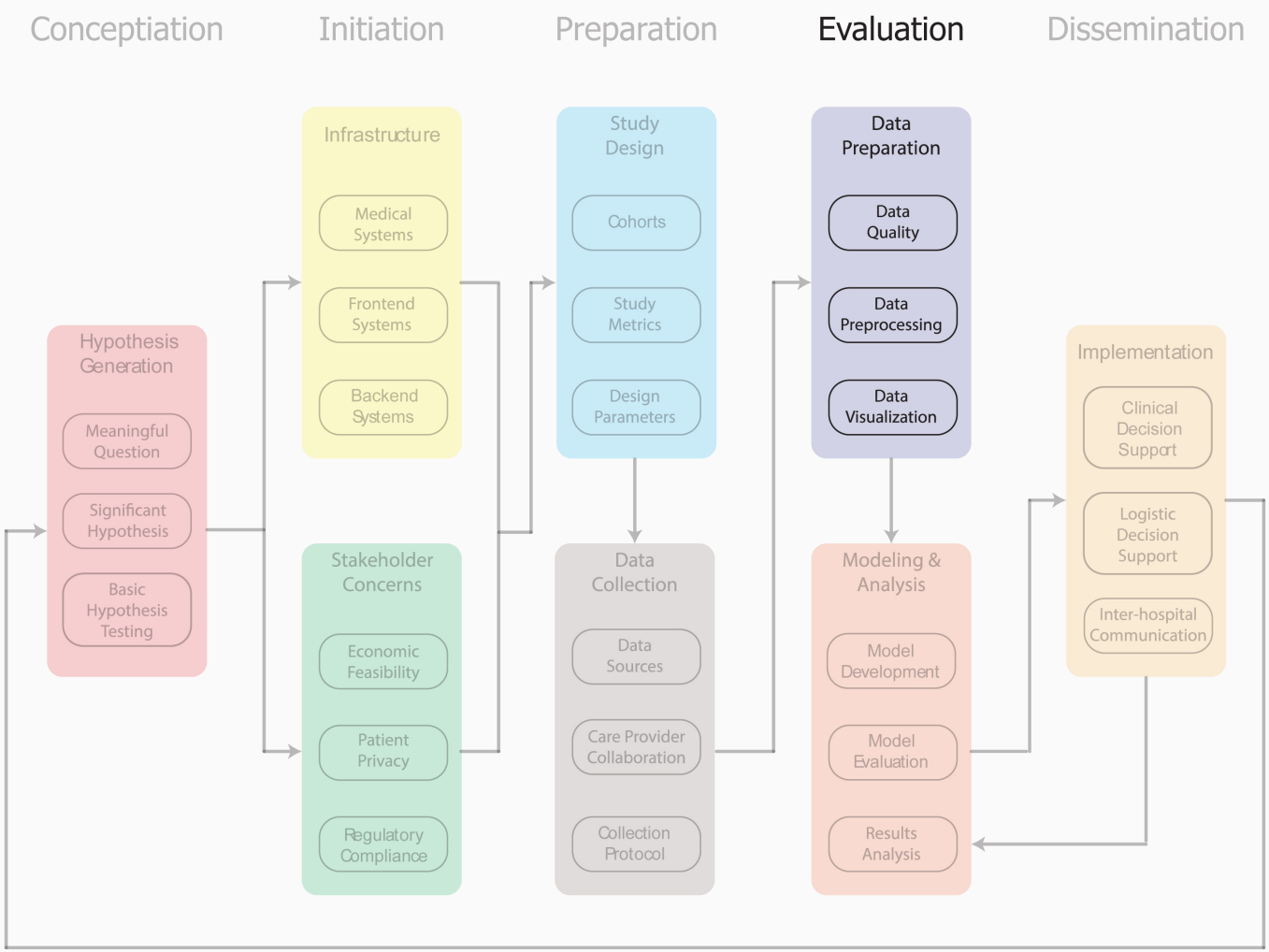
Center for Health Data Innovations

Exploratory Data Analysis

Bioinformatics Pipeline



Data Analysis



EDA

- Objectives
  - Define EDA
  - Know the purpose of EDA
  - Understand a visualization toolbox
  - Ask questions about data using EDA

What is EDA?

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  - An method of summarizing the main points of a data set, most often using visualization
  - Distinct from other types of analysis for confirming or validating hypotheses
  - Used to find hidden structure in the data, e.g., unknown relations between the variables or correlation with the target variable

Why visualize?

Why not just use summary statistics?

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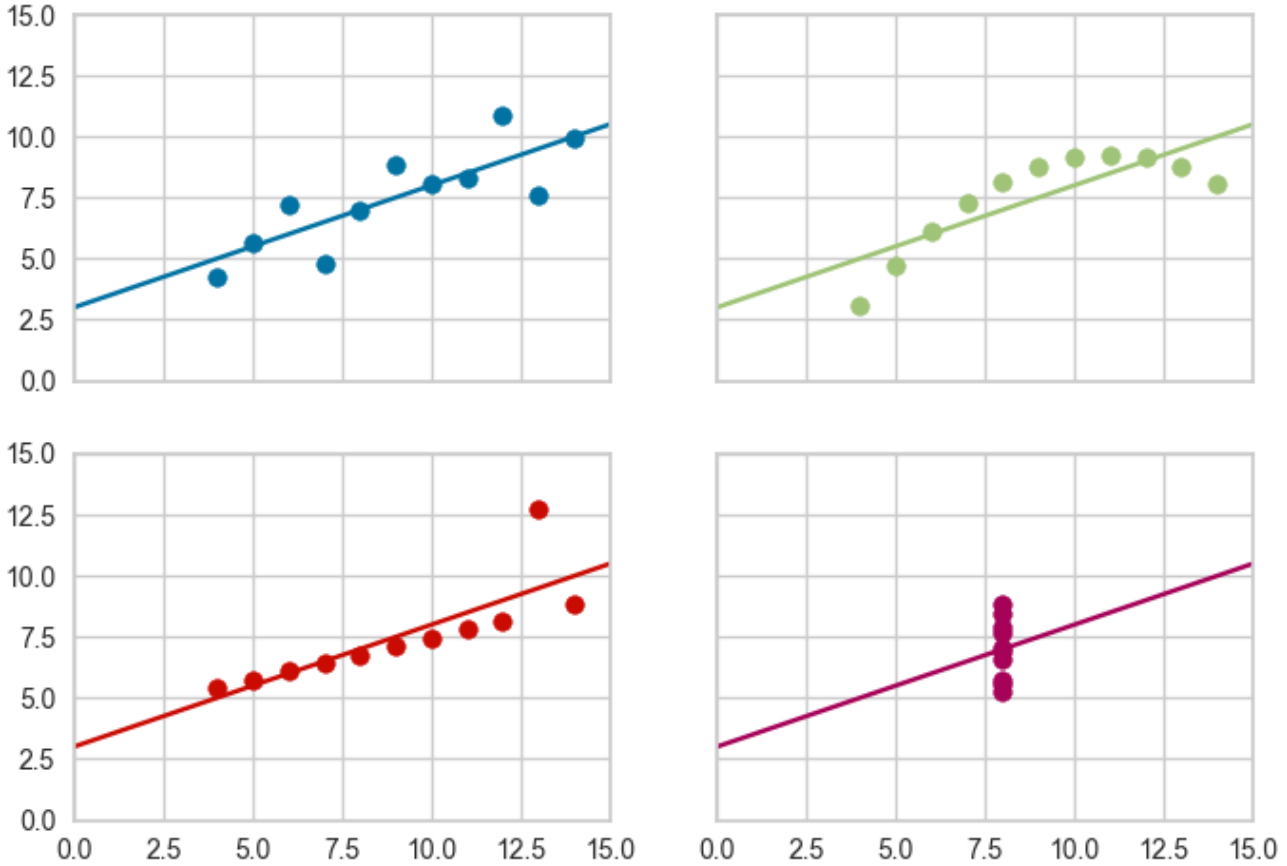
Figure 1: Anscombe's Quartet



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  - Understand the types of data in the data set
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    - Categorical
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  - Determine the parameters of the data set
    - Min, max, median, and percentiles of numerical data
    - Distribution of the numerical data
    - Count, number of unique values, most common value, and frequency of most common values for categorical values
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    - Range and rolling values of a time series
  - Develop hypothesis
  - Determine what prepossessing and modeling are appropriate

Summary Stats

Summary Stats on Appt. Attendance Data Set

	ApptTime	LeadDays	PatientAge
mean	11.663151	44.736143	44.722064
std	2.299348	35.997952	22.396794
min	8.100000	-3.000000	0.000000
25%	9.500000	15.000000	26.000000
50%	11.100000	35.000000	46.000000
75%	14.000000	70.000000	62.000000
max	16.300000	369.000000	104.000000

Summary Stats

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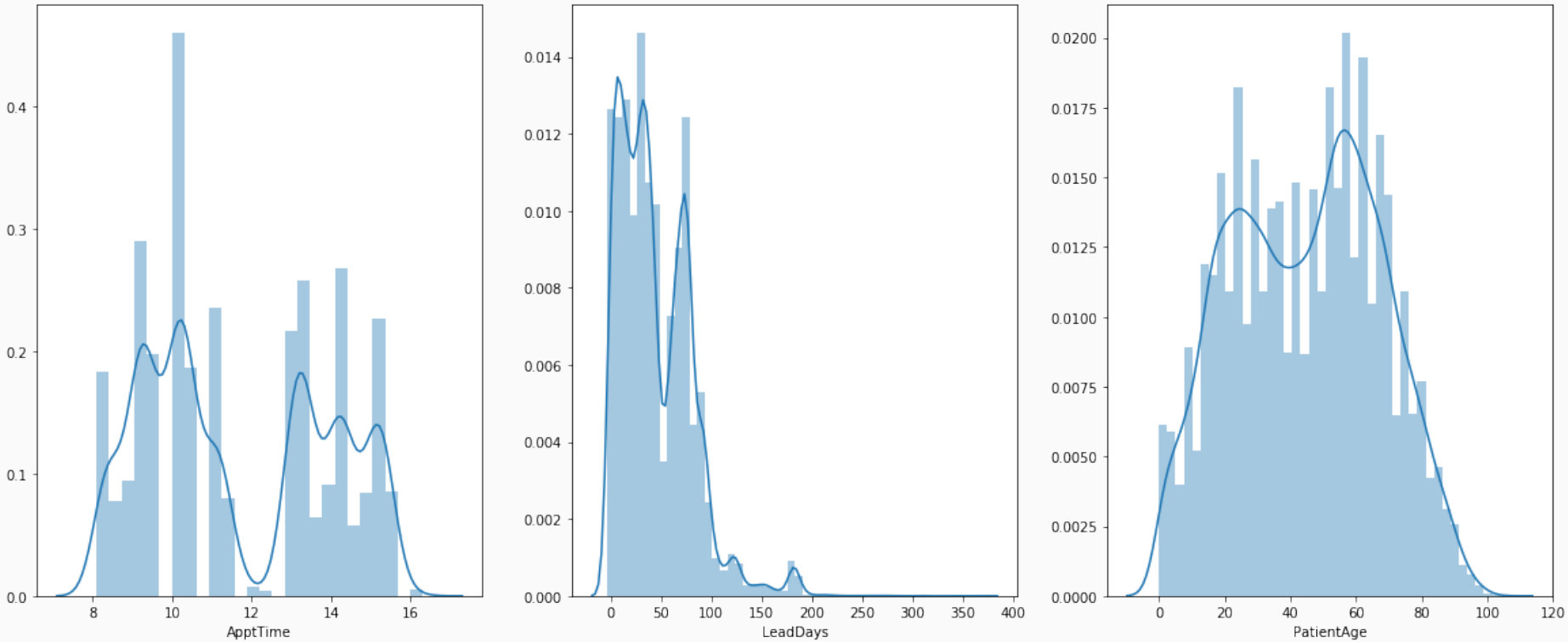
	ApptMonth	ApptDays	AppointmentBlock
count	21451	21451	21451
unique	12	5	5
top	May	Tue	None
freq	2023	4971	20932

Visualization Toolbox

Univariate exploration

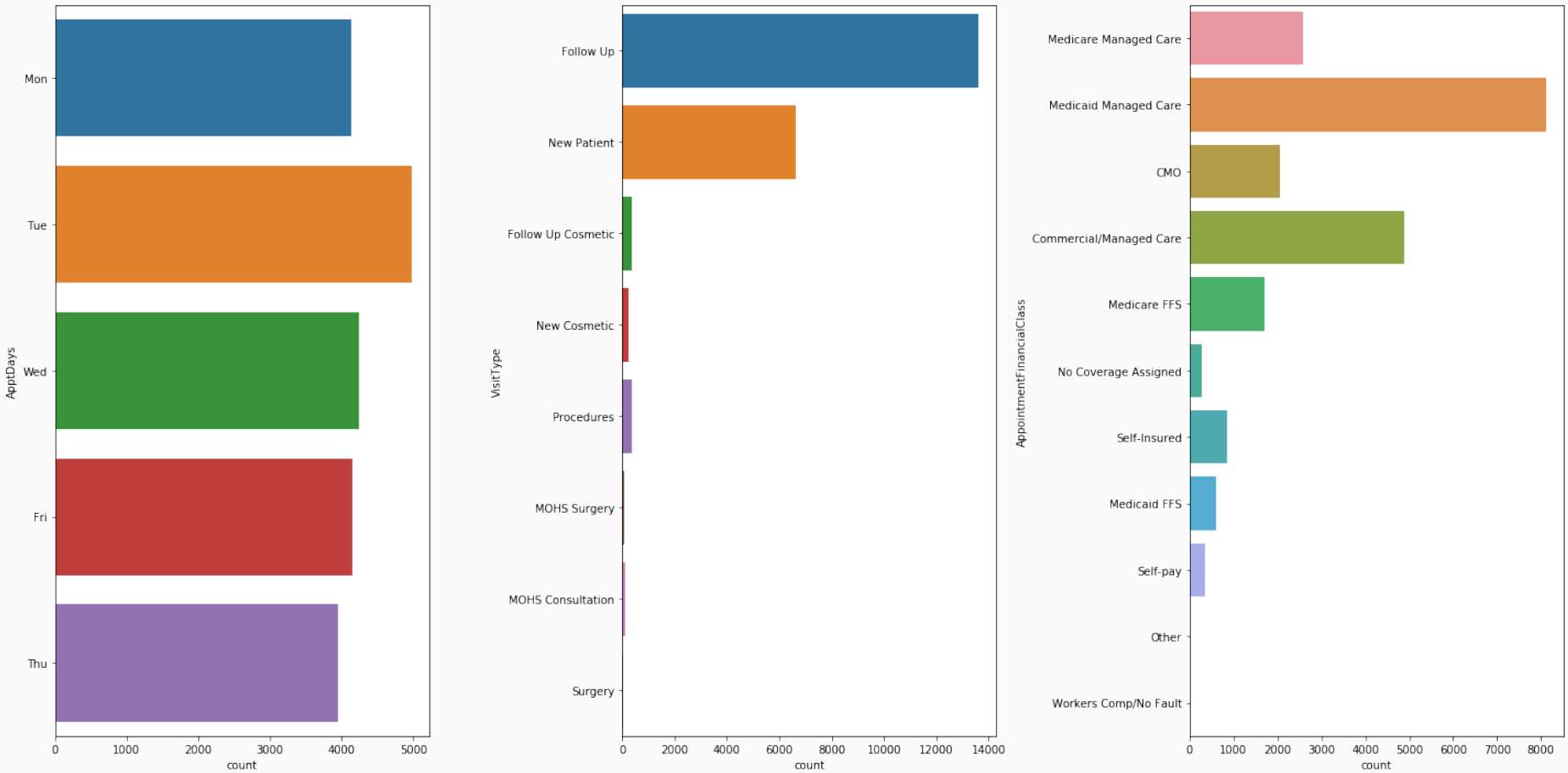
Figure 2: Distributions of continuous variables



Visualization Toolbox

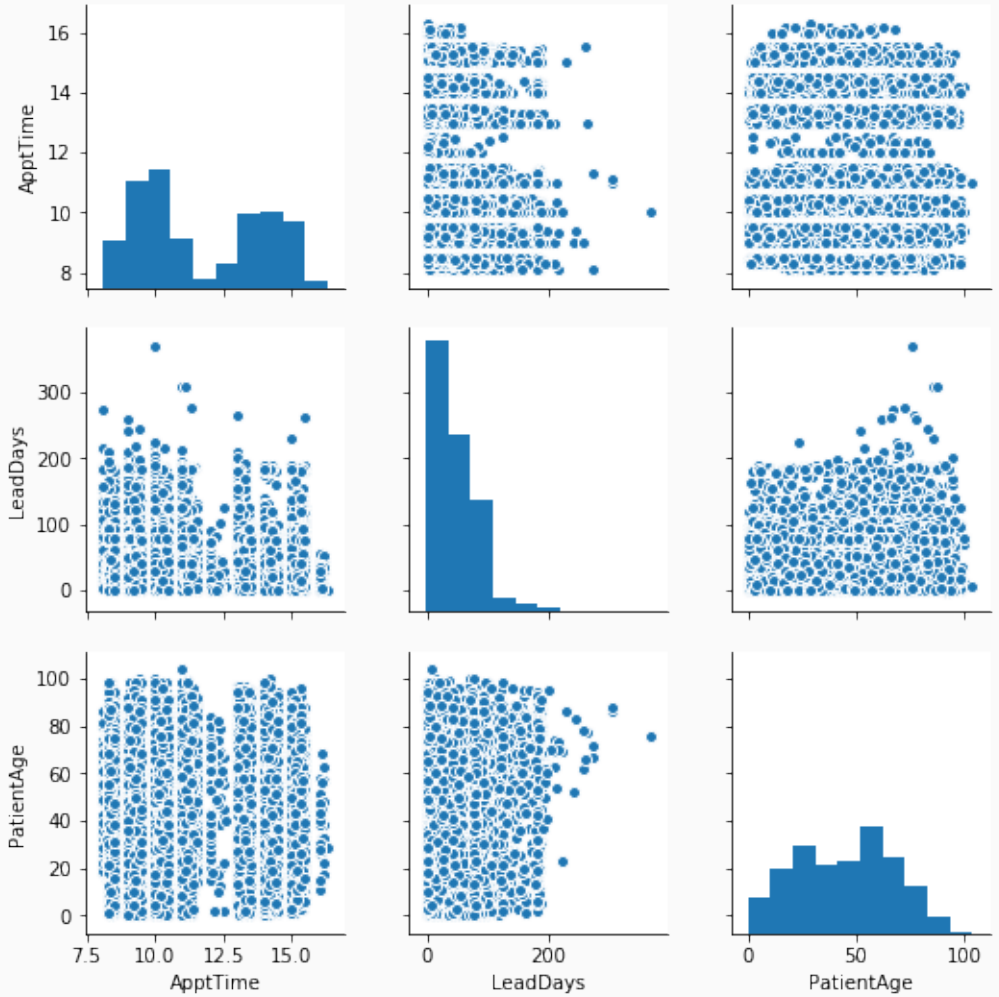
Univariate exploration

Figure 3: Counts of discreet variables



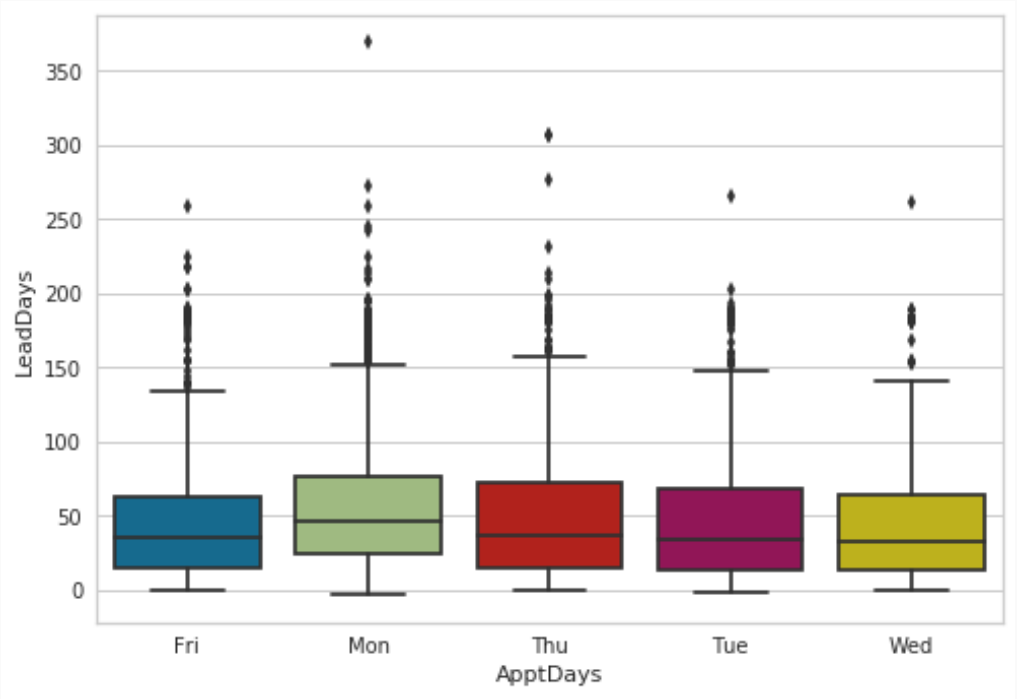
Bivariate exploration

Figure 4: Pair plot of continuous variables



Bivariate exploration

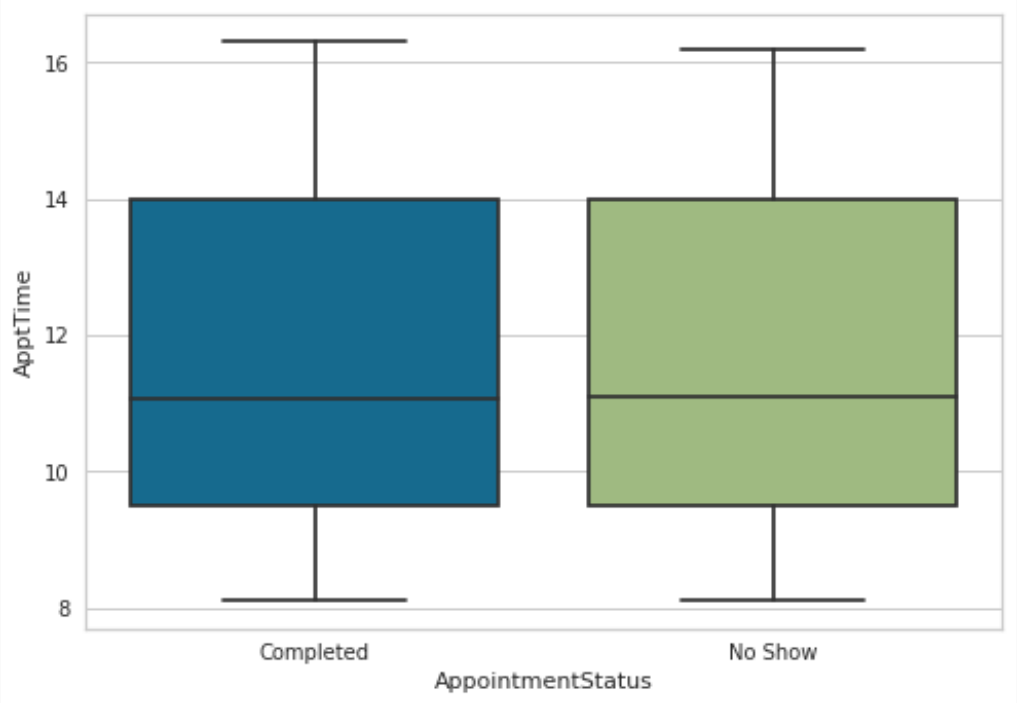
Figure 5: Box plots discrete-continuous variables



Visualization Toolbox

Bivariate exploration

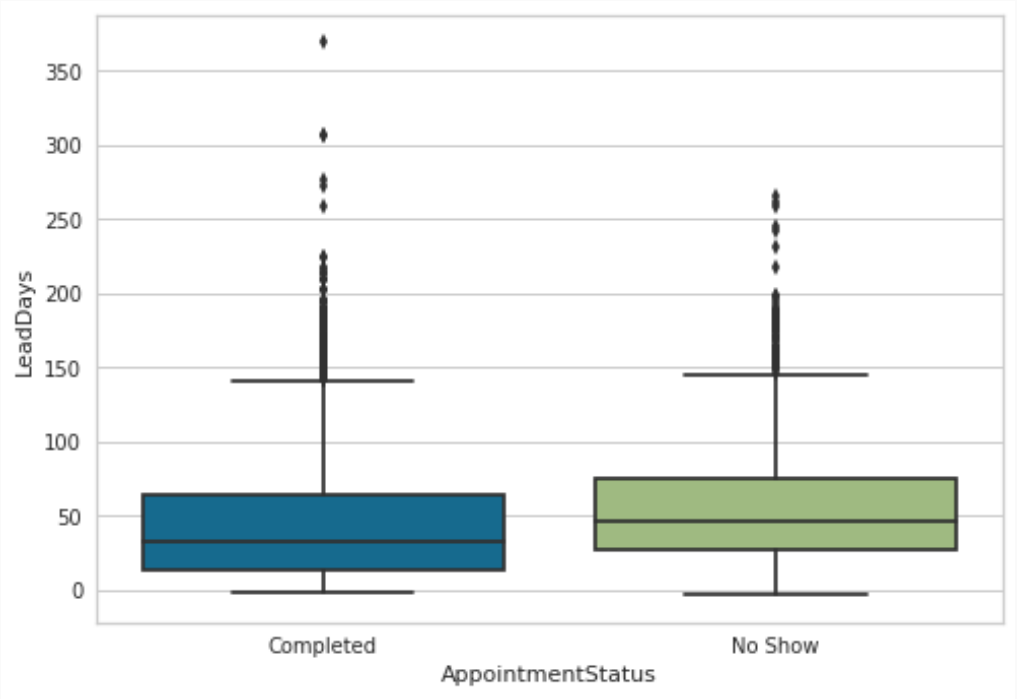
Figure 6: Box plots discrete-continuous variables



Visualization Toolbox

Bivariate exploration

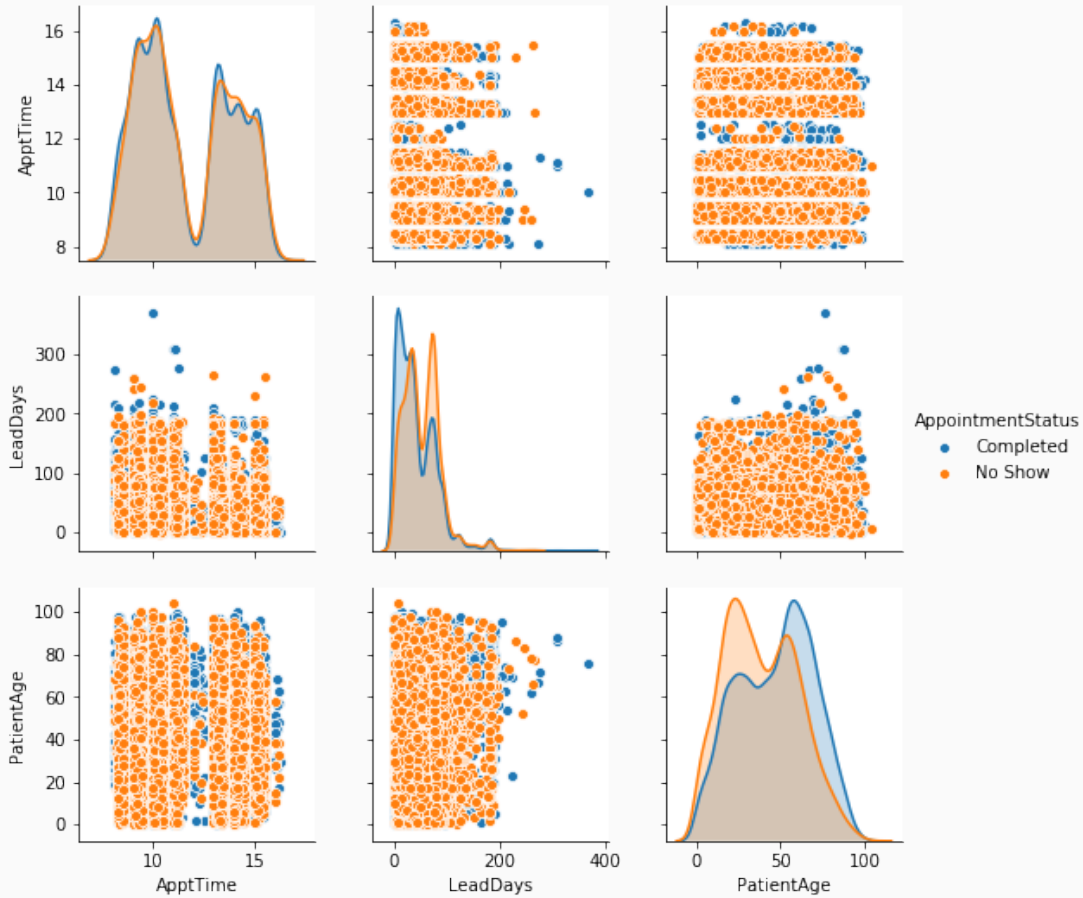
Figure 7: Box plots discrete-continuous variables



Visualization Toolbox

Bivariate exploration with target

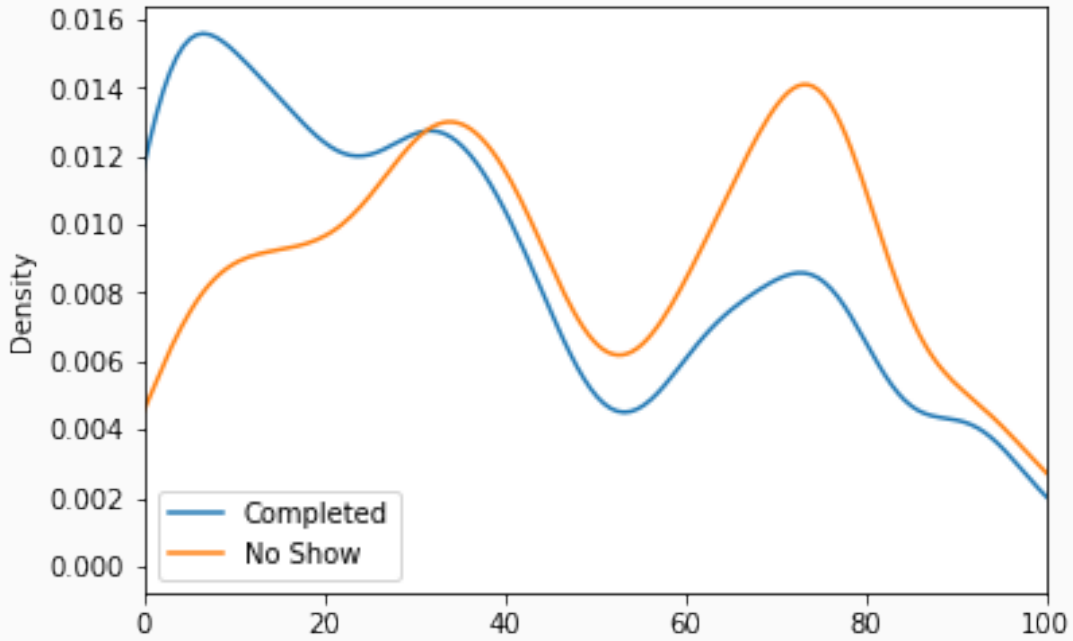
Figure 8: Pair plot with groups indicated



Visualization Toolbox

Bivariate exploration with target

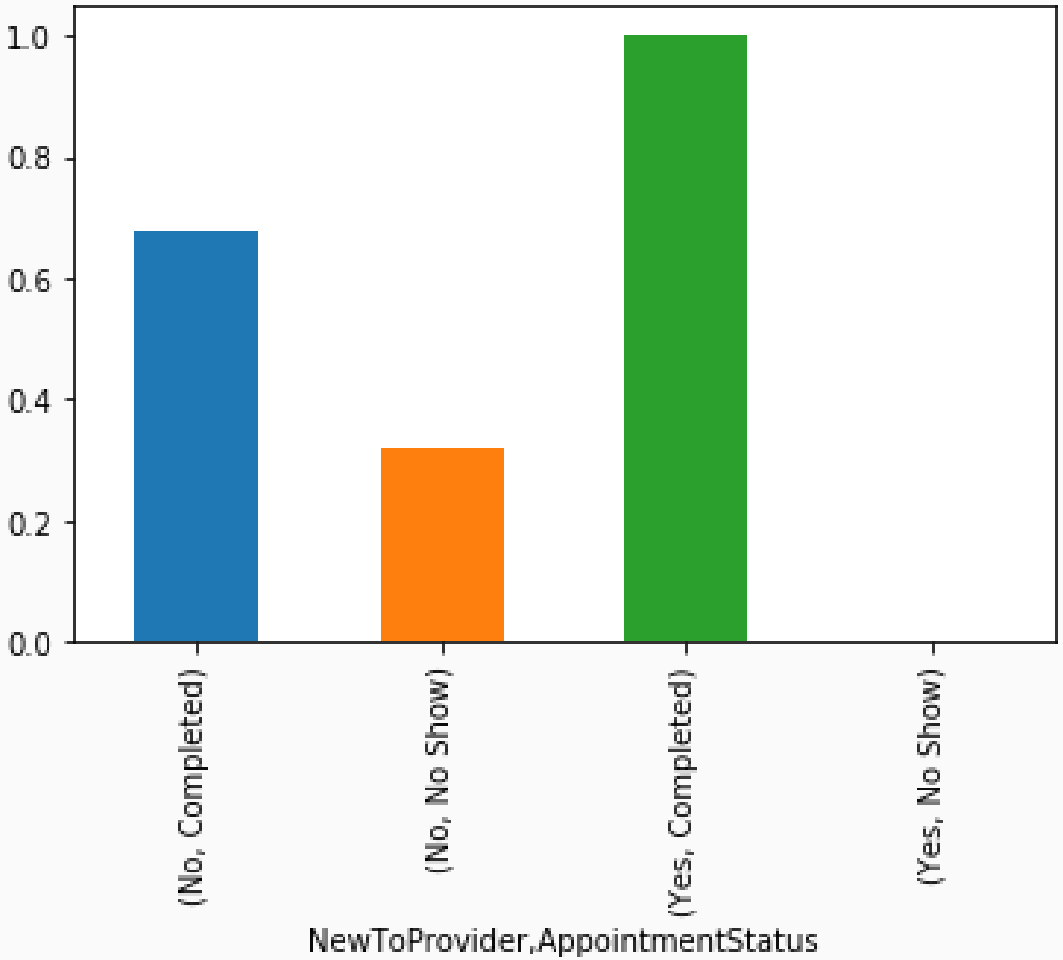
Figure 9: KDE Plot of variable with target groups



Visualization Toolbox

Bivariate exploration with target

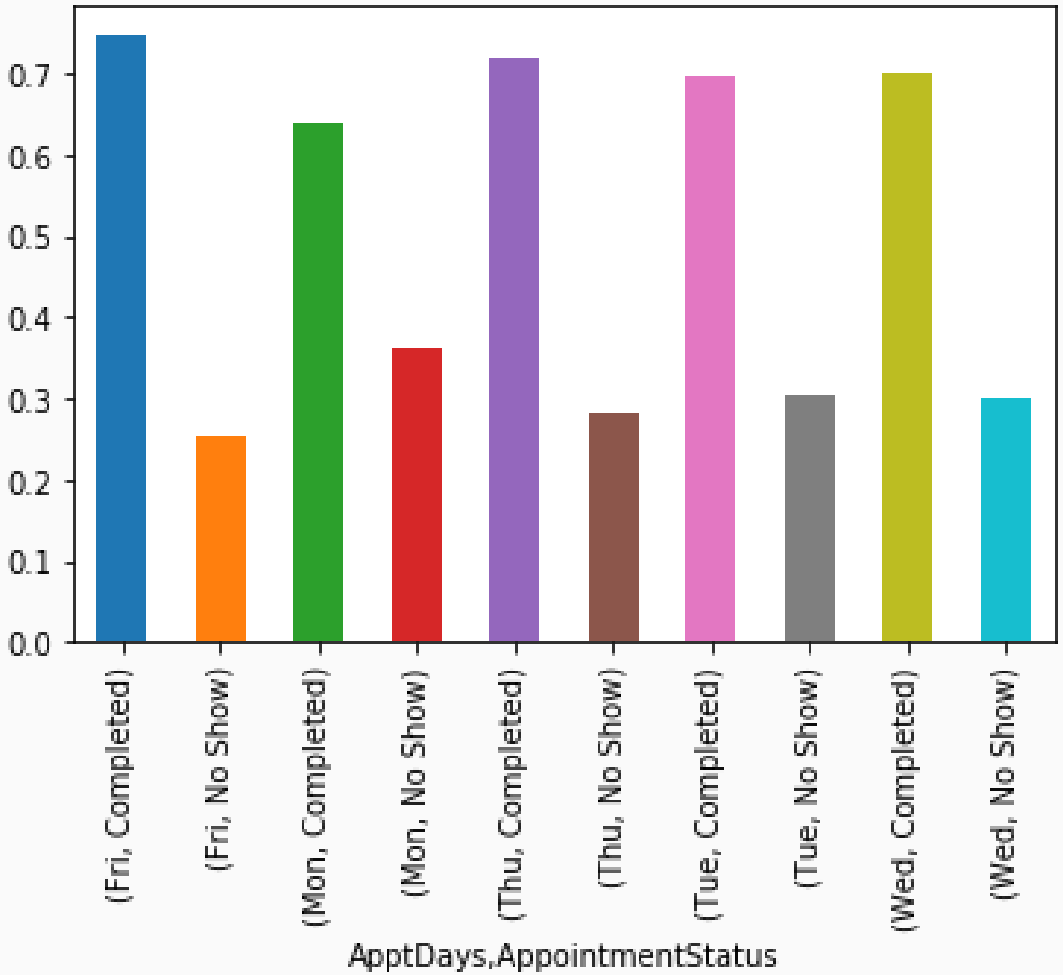
Figure 10: Count plot with target



Visualization Toolbox

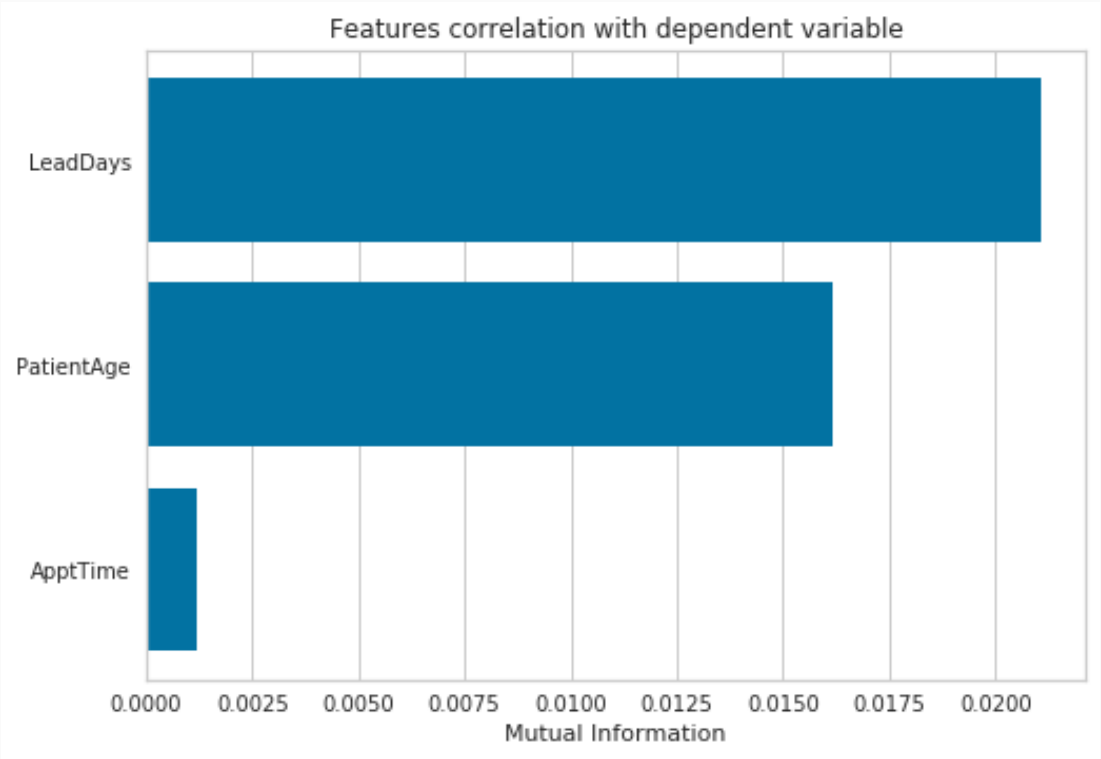
Bivariate exploration with target

Figure 11: Counts of discreet variables



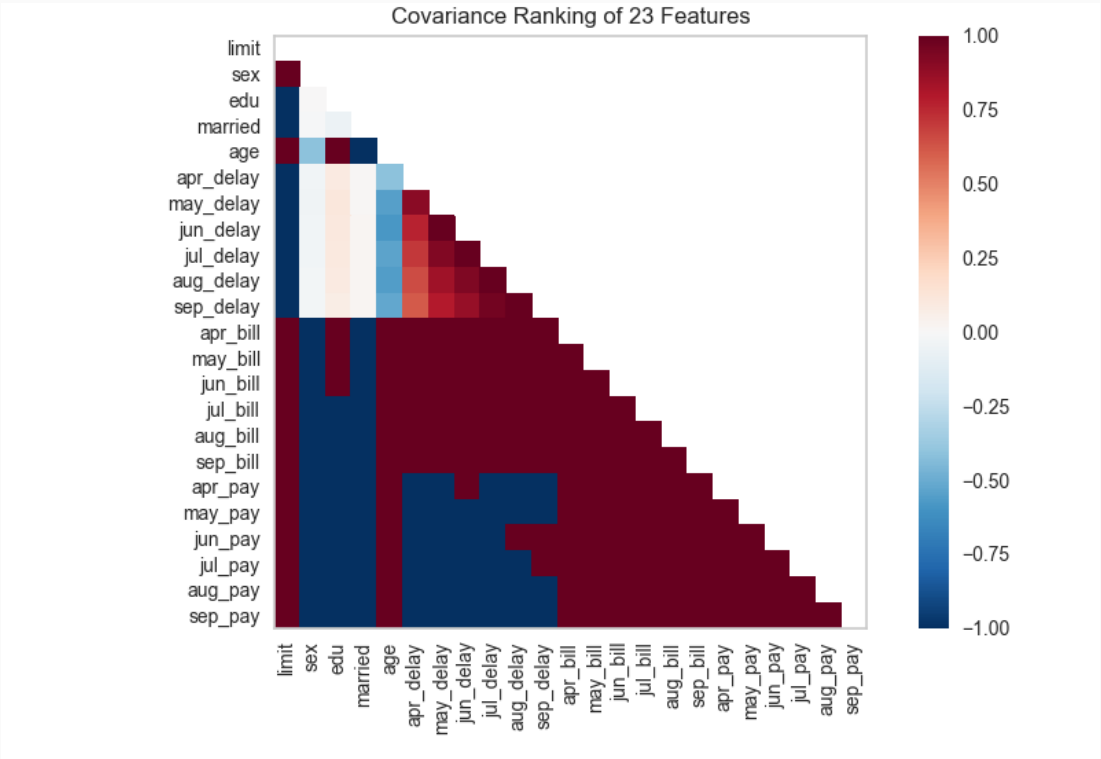
Feature Selection

Figure 12: Relationship between the variables and the target



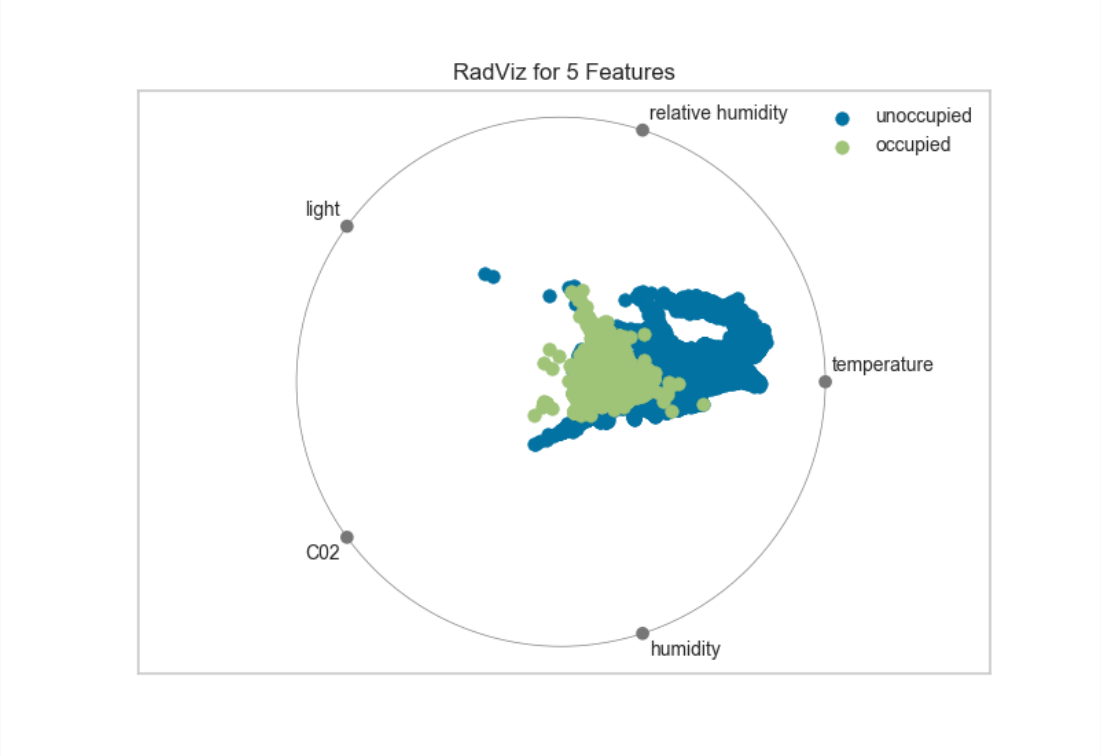
Other Visualizations

Figure 13: Covariance between variables



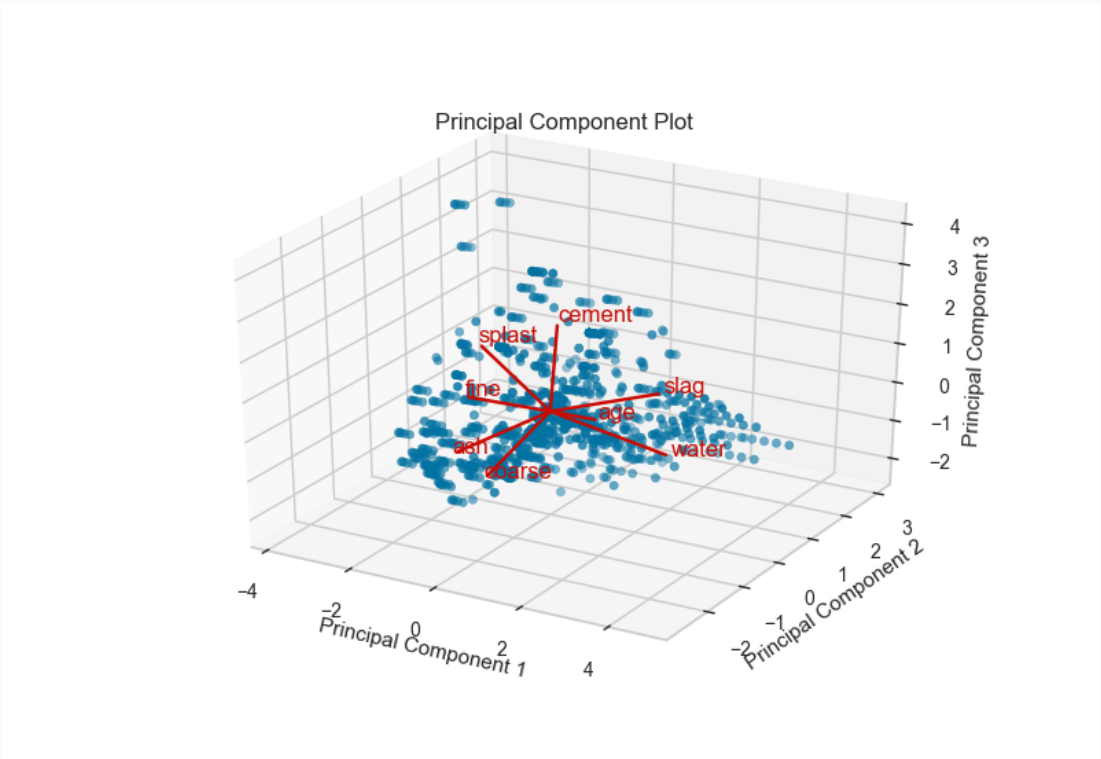
Other Visualizations

Figure 14: Radial plot to determine variable separability



Other Visualizations

Figure 15: PCA with axis plotted



Other Visualizations

Figure 16: Parallel coordinate plot