

# Exercise 2 : Basic Statistics

## Workflow

1. Create a folder on your Desktop and name it Cx1115\_[LabGroup], where [LabGroup] is the name of your Group.
2. Download the .ipynb files and data files posted corresponding to this exercise and store in the aforesaid folder.
3. Open Jupyter Notebook (already installed on the Lab computer) and navigate to the aforesaid folder on Desktop.
4. Open and explore the .ipynb files (notebooks) that you downloaded, and go through “Preparation”, as follows.
5. The walk-through videos posted on NTU Learn (under Course Content) may help you with this “Preparation” too.
6. Create a new Jupyter Notebook, name it Exercise2\_solution.ipynb, and save it in the same folder on the Desktop.
7. Solve the “Problems” posted below by writing code, and corresponding comments, in Exercise2\_solution.ipynb.

Try to solve the problems on your own. Take help and hints from the “Preparation” codes and the walk-through videos. If you are still stuck, talk to your friends in the Lab to get help/hints. If that fails too, approach the Lab Instructor.

Note : Don’t forget to import the Essential Python Libraries required for solving the Exercise. Write code in the usual “Code” cells, and notes/comments in “Markdown” cells of the Notebook. Check the preparation notebooks for guidance.

## Preparation

M2 BasicStatistics.ipynb

Check how to import the Pokemon data and perform basic Statistics  
You will need the CSV data file pokemonData.csv to use this code

M2 ExploratoryAnalysis.ipynb

Check how to import the Pokemon data and perform Exploratory Analysis  
You will need the CSV data file pokemonData.csv to use this code

## Problems

### Problem 1 : Data Preparation

Download the dataset **train.csv** and the associated text file **data\_description.txt** posted with this Exercise. The dataset and description are collected from Kaggle. You may also want to download the files directly from the Kaggle Competition (Login > Go to “Data” > “Download All”). Either way, read the competition description to get an idea about the task.

Source : Kaggle Competition : House Prices : <https://www.kaggle.com/c/house-prices-advanced-regression-techniques>

- a) Import the “train.csv” data you downloaded (either from NTU Learn or Kaggle) in Jupyter Notebook.
- b) What are the data types (“dtypes”) - int64/float64/object - of the variables (columns) in the dataset?
- c) Create a new Pandas DataFrame consisting of only the variables (columns) of type Integer (int64).
- d) Open the “data\_description.txt” file you downloaded (either from NTU Learn or Kaggle) in Wordpad.  
Read the description for each variable carefully and try to identify the “actual” Numeric variables.  
Categorical variables are often “encoded” as Numeric variables for easy representation. Spot them.
- e) Drop non-Numeric variables from the DataFrame to have a clean DataFrame with Numeric variables.

### Problem 2 : Statistical Summary

Now that you have a “clean” DataFrame with only Numeric variables, we can safely perform standard statistics.

- a) Find the Summary Statistics (Mean, Median, Quartiles etc.) of SalePrice from the Numeric DataFrame.
- b) Visualize the summary statistics and distribution of SalePrice using standard Box-Plot, Histogram, KDE.
- c) Find the Summary Statistics (Mean, Median, Quartiles etc) of LotArea from the Numeric DataFrame.
- d) Visualize the summary statistics and distribution of LotArea using standard Box-Plot, Histogram, KDE.
- e) Plot SalePrice (y-axis) vs LotArea (x-axis) using jointplot and find the Correlation between the two.

## Data Description

Note carefully that Categorical variables can be “encoded” in either of two ways, as follows. Even if a categorical variable is “encoded” as numbers, interpreting it as a numeric variable is wrong. Thus, one should be careful in reading the given data description file and identifying the “actual” numeric variables from the dataset to perform statistical exploration.

**MSSubClass:** Identifies the type of dwelling involved in the sale.

20	1-STORY 1946 & NEWER ALL STYLES
30	1-STORY 1945 & OLDER
40	1-STORY W/FINISHED ATTIC ALL AGES
45	1-1/2 STORY – UNFINISHED ALL AGES
50	1-1/2 STORY FINISHED ALL AGES
60	2-STORY 1946 & NEWER
70	2-STORY 1945 & OLDER
75	2-1/2 STORY ALL AGES
80	SPLIT OR MULTI-LEVEL
85	SPLIT FOYER
90	DUPLEX – ALL STYLES AND AGES
120	1-STORY PUD (Planned Unit Development) – 1946 & NEWER
150	1-1/2 STORY PUD – ALL AGES
160	2-STORY PUD – 1946 & NEWER
180	PUD – MULTILEVEL – INCL SPLIT LEV/FOYER
190	2 FAMILY CONVERSION – ALL STYLES AND AGES

Numeric Encoding

Levels represented as individual Integers

**MSZoning:** Identifies the general zoning classification of the sale.

A	Agriculture
C	Commercial
FV	Floating Village Residential
I	Industrial
RH	Residential High Density
RL	Residential Low Density
RP	Residential Low Density Park
RM	Residential Medium Density

Character Encoding

Levels represented as individual Characters

## Bonus Problem

Create a new Pandas DataFrame consisting of all variables (columns) of type Integer (int64) or Float (float64). Read the description for each variable carefully and try to identify the “actual” Numeric variables in the data.

Drop non-Numeric variables from the DataFrame to have a clean DataFrame with only the Numeric variables. Plot SalePrice vs each of the Numeric variables you identified to understand their correlation or dependence.