

TCDSB [#DataDunkers](#) Students Workshop, November 2023

Peter Beens

Twitter/X: [@pbeens](#)

Email: pbeens@gmail.com

Mastodon: mstdn.ca/@pbeens



bit.ly/dd-slides



Our Goal?

To get you to confidently use Jupyter Notebooks and the Python programming language to analyze data from Pascal Siakam's basketball career with the Toronto Raptors.



Overview

- [Activity Demos](#)
- [Introduction to Jupyter Notebooks](#) (Cell Types, Markdown, Running Python Code)
- [Shoot Some Hoops!](#)
- [How Do We Get the Data?](#) (Internal, CSV, Excel, Webpages, Google Sheets)
- [Activity: Mini Basketball Labyrinth](#)
- [Previewing the Data](#) (Columns, Filtering, Sorting)
- [Visualizing the Data](#) (Bar Charts, Scatter Plots, Pie Charts, Histograms)
- [Basic Statistics](#) (min, max, median, mean)
- [Activity: Mini Hoops Graph](#)

Activity Demos (1/2)

1. [Mini Hoops Activity](#) (Intro Only)
2. Mini Basketball Labyrinth (Intro Only)

bit.ly/hoops-data

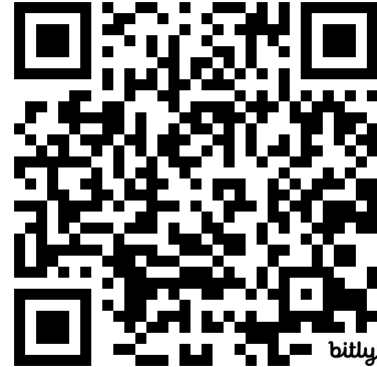


Activity Demos (2/2)

1. Mini Hoops Activity (Intro Only)
2. [Mini Basketball Labyrinth](#) (Intro Only)

bit.ly/dd-mini-bb

Key: **WNBA**

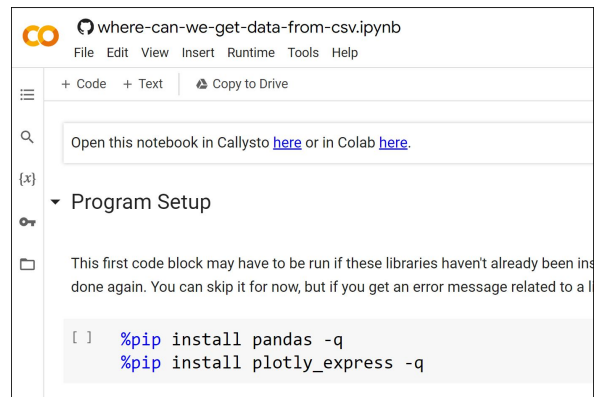


Introduction to Jupyter Notebooks (1/2)

1. Lesson: Jupyter Notebook Demo

- a. Callysto vs Google Colab Discussion
- b. Basics of Markdown
 - i. Code Cells vs Markdown Cells (*Pay attention to “Hello world” example program!*)

2. Class Activity: hello-world



Introduction to Jupyter Notebooks (2/2)

1. Lesson: Jupyter Notebook Demo
2. [Class Activity: hello-world](#)
 - a. Basic Python syntax
 - b. How to run code in a code cell

Shoot Some Hoops!

Whenever you see this graphic at the end of a lesson, shoot some hoops and enter it on the form. Clicking on the graphic will take you to the form.

Remember to always enter your name the same way, and never enter your last name.



How Do We Get the Data? (1/5)

1. Internal List Data

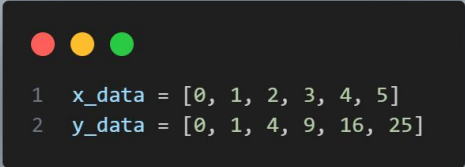
a. Shows how to use internal list data ([]) to produce a line chart.

2. CSV (Comma Separated Values) File

3. Excel File

4. Webpage

5. Google Sheets



```
1 x_data = [0, 1, 2, 3, 4, 5]
2 y_data = [0, 1, 4, 9, 16, 25]
```

How Do We Get the Data? (2/5)

1. Internal List Data

2. CSV (Comma Separated Values) File

- a. Shows how to access data from a Comma Separated Values (CSV) file.
- b. Introduces how to use `head()` and `tail()` to show the top or bottom rows, respectively, of your data.
- c. Introduces how to get the name of the columns using `df.columns`.
- d. Introduces how to rename columns.
- e. Introduces Python variables.

3. Excel File

4. Webpage

5. Google Sheets



How Do We Get the Data? (3/5)

1. Internal List Data
2. CSV (Comma Separated Values) File
3. Excel File
 - a. Shows how to access data from an Excel file.
4. Webpage
5. Google Sheets

	A	B
1	X	Y
2	0	0
3	1	1
4	2	4
5	3	9
6	4	16
7	5	25

How Do We Get the Data? (4/5)

1. Internal List Data
2. CSV (Comma Separated Values) File
3. Excel File
4. Webpage
 - a. Shows how to access data from a table on a webpage.
 - b. Pay attention to how to choose which table to “scrape”.
5. Google Sheets

X	Y
0	0
1	1
2	4
3	9
4	16
5	25

How Do We Get the Data? (5/5)

1. Internal List Data
2. CSV (Comma Separated Values) File
3. Excel File
4. Webpage
5. Google Sheets
 - a. Shows how to access data from a Google Sheet.
 - b. Pay attention to the Google Sheet permission and how to change the URL.

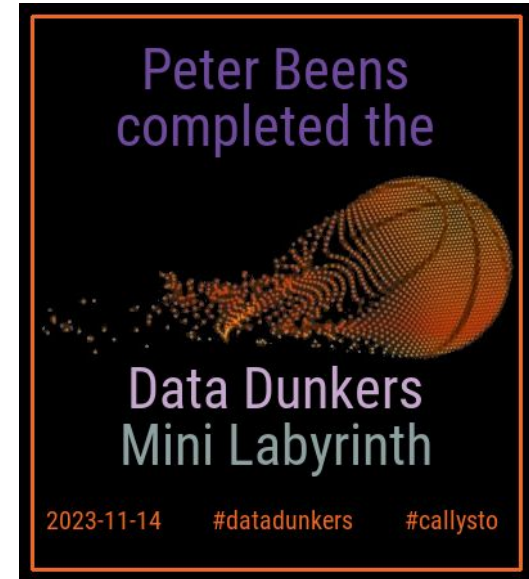


Shoot some hoops!

Activity: Mini Basketball Labyrinth

bit.ly/dd-mini-bb

Key: **WNBA**



Previewing the Data (1/4)

1. Columns

- a. How to see what columns are in the data.
- b. How how to view specific columns of the data.

2. Making New Columns

3. Filtering Data

4. Sorting Data



```
1 display(df[['FG', 'FGA']])
```

Previewing the Data (1/4)

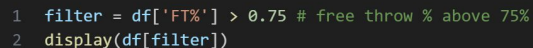
1. Columns
2. Making New Columns
 - a. We learn how to make new columns using the data from other columns.
 - b. We learn how to use `round()` to round numbers.
3. Filtering Data
4. Sorting Data



```
1 # Calculate the shot average for each player and add it as a new column to the data frame
2 raptors_df['Shot Average (%)'] = (raptors_df['FG%'] + raptors_df['FT%']) / 2 * 100
```


Previewing the Data (3/4)

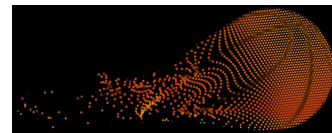
1. Columns
2. Making New Columns
3. Filtering Data
 - a. How to extract data that meets specific criteria.
4. Sorting Data

A terminal window with a dark background and three colored window control buttons (red, yellow, green) in the top left corner. It contains two lines of Python code.

```
1 filter = df['FT%'] > 0.75 # free throw % above 75%
2 display(df[filter])
```

Previewing the Data (4/4)

1. Columns
2. Making New Columns
3. Filtering Data
4. Sorting Data
 - a. How to sort the data using `df.sort_values()`.
 - b. How to delete unwanted rows using `df.drop()`.



Visualizing the Data (1/4)

1. Bar Charts

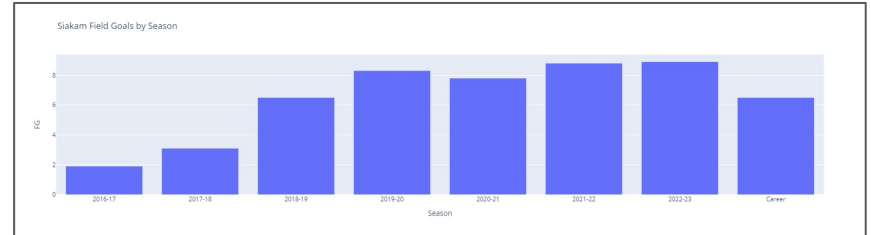
- How to create a bar chart.
- How to plot multiple columns using a list ([]).
- How to rename the x-axis using `fig.update_xaxes(title='')`.
- How to rename the y-axis using `fig.update_yaxes(title='')`.

2. Scatter Plots

3. Pie Charts

4. Histograms

(We have already done Line Charts)



Visualizing the Data (2/4)

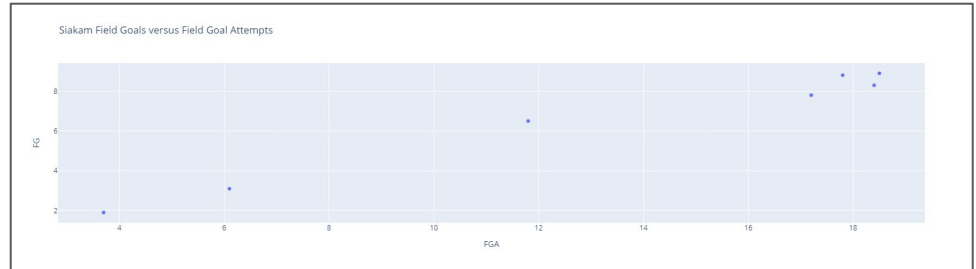
1. Bar Charts

2. Scatter Plots

- How to create a scatter plot.
- How to delete unwanted rows using `df.drop(n, inplace=True)`.
- Method chaining* is introduced.
- The *Plotly Express* `color=` and `size=` options are introduced.

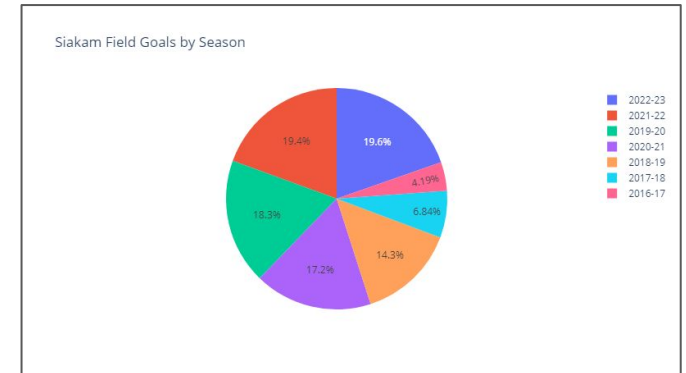
3. Pie Charts

4. Histograms



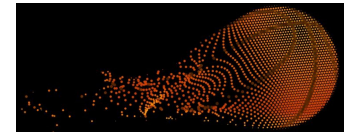
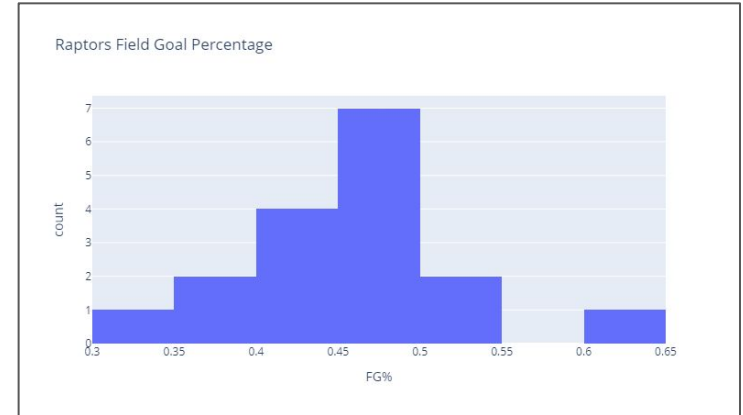
Visualizing the Data (3/4)

1. Bar Charts
2. Scatter Plots
3. Pie Charts
 - a. How to create a pie chart.
4. Histograms



Visualizing the Data (4/4)

1. Bar Charts
2. Scatter Plots
3. Pie Charts
4. Histograms
 - a. How to create a histogram.



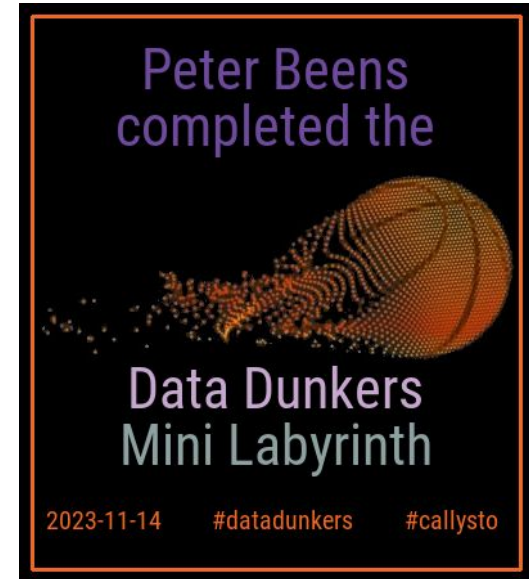
Basic Statistics

1. Basic Statistics

- a. Looking at basic statistics such as `min()`, `max()`, `median()`, `mean()`.
- b. How to look at the stats of all the numeric columns.
- c. How to look at the stats of all columns using `df.describe()`.
- d. How to use *f-strings* to control the number of decimal places that are printed.

Activity: Mini Hoops Graph

bit.ly/hoops-data



Thank you!