What is Data Science?
Data science, also known as data-driven science, is an interdisciplinary field about scientific methods, processes, and systems to extract knowledge or insights from data in various forms.

Standard Lifecycle of Data Science Projects
Data Science Project lifecycle has 6 steps
1 Business Understanding
2 Data Understanding
3 Data Preparation
4 Modelling
5 Evaluation
6 Deployment

Python Eco System for Data Science
Python's popularity for data science is largely due to the strength of its core libraries
1. NumPy 2. SciPy 3. Pandas
4. Matplotlib 5. Seaborn

Best Book: Doing Data Science
Authors: Cathy O'Neil, Rachel Schutt

What is Machine Learning?
Machine Learning is a type of Artificial Intelligence that provides the computers the ability to learn without being explicitly programmed.
OR
Machine learning is when machine learns to program itself!

Different machine learning techniques
Machine learning uses two types of techniques:
1. Supervised Learning
Which trains a model on known input and output data so that it can predict future outputs.
It is basically classified into the following two types:
a. Classification
b. Regression

2. Unsupervised Learning
Group and interpret data based only on input data.
a. Clustering
b. Principal Component Analysis

Applications Of Machine Learning
1. Social Media 2. Search Engines
3. Health Care 4. Banking & Finance
5. Legal Services 6. Retail
7. Public Services 8. Security

Top 5 Machine Learning Libraries
1. TensorFlow 2. Scikit -Learn (SKLearn)
3. Keras 4 NLTK 5. PyTorch

Machine Learning Mastery with PYTHON==> Jason Brownlee
Introduction to Machine Learning with Python==>Andreas C. Müller &

Sarah Guido

What is Deep Learning?
Deep learning is a machine learning technique that teaches computers to do what comes naturally to humans.
OR
Deep learning is a subset of machine learning in Artificial Intelligence.

TOP 5 Deep Learning Frameworks:
1 Theano 2 TensorFlow 3 Lasagne
4 Keras 5 MXNet

Deep Learning with Python==>Nikhil Ketkar
Deep Learning with Python==>Francois Chollet

Artificial Intelligence
AI makes it possible for machines to learn from experience.
OR
AI is the simulation of human intelligence by machines.

Applications of AI
1. Gaming
2. Natural Language Processing and translation
3. Expert Systems 4. Vision Systems
5. Speech Recognition
6. Handwriting Recognition
7. Intelligent Robots
8. Data mining, Web Crawler
9. Vision, Virtual Reality

AI A Modern Approach ==> Peter Norvig and Stuart J. Russell

What is IoT?
A network of internet-connected objects able to collect and exchange data using embedded sensors.

IoT Companies
Google, Amazon, AT&T, Cisco, IBM, Honeywell, Microsoft, Apple, Android etc.....

IoT Areas:
1. Smart Health 2. Smart Living
3. Smart Industry 4. Animal Tracking
5. Smart Agriculture 6. Smart Homes
7. Smart Transport 8. Smart Energy
8. Smart Cities

Raspberry Pi: (From Python)
It is a credit-card-sized computer that plugs into your TV and a keyboard. It is a capable little computer which can be used in electronics projects.

Best Book for: IoT-with-python==>Gaston-c-hillar

PYTHON-SELENIUM TEST AUTOMATION

Software Testing can be done in two ways.
a) Manual Testing
Testing an Application by giving manually inputs and observing manually outputs...!!
b) Test Automation
Testing an application with the help of third-party testing tools.

i) Advantages of Manual Testing
1 No Test Tool cost
2 No Environment Limitations
3 Useful for Short term projects
4 Programming knowledge is not required.

Disadvantages:
1 It takes MoreTime/MoreResources/Both
2 Comparing large amount of data is difficult
3 Less Test Coverage, Less Accuracy

Advantages of Test Automation
1 Fast: Test Tool is faster in execution
2 Reusable: Sanity Tests, Regression Tests
3 Repeatable: Data Driven Tests
4 Reliable:
5 Programmable:

Disadvantages
1 Not suitable for short term projects
2 100% Test automation is not possible
3 All types of testing are not possible
4 Lack of knowledge, Debugging issues

Types of Testing-Tools
i. Functional/Regression Test Tools
ii. Performance Test Tools
iii. Mobile Test Tools
iv. Test Management Tools
v. Defect Management Tools

Functional and Regression Test Tools
Test Tools for Functional ion Testing
1. Selenium (Open Source Tool)
2. UFT/QTP (Commercial Tool)
3. RFT (Commercial Tool)
4. SoapUI (Open Source Tool)
5. SilkTest (Commercial Tool)

Performance Test Tools
Popular Test Tools for Performance Testing
1. LoadRunner (Commercial Tool)
2. JMeter (Open Source Tool)
3. Silk Performer (Commercial Tool)
4. WebLoad(Commercial Tool)

Mobile Test Tools
Popular Test Tools for Mobile Testing
Mobile Software Applications
a. Native Applications b. Web Applications

c. Hybrid Application
1. Appium (Open Source Tool)
2. Silk Mobile (Commercial Tool)

Introducing Selenium and Features:
> It is a suite of software tools to automate web browsers
> It is a open source software
> Selenium supports various Operating environments (Windows, UNIX, Macintosh etc...)
> Selenium supports various browsers (Mozilla firefox, IE, Chrome, Opera, Safari etc...)
> Selenium supports various Programming and scripting languages to design and execute tests.
PYTHON, C#, PHP, Perl, Java, Ruby, JavaScript

Limitations of Selenium
> Since it is open source tool, No reliable Technical support
> It doesn't support Desktop Applications/Windows Applications
> Difficult to use, New features may not work properly

History of the Selenium
1. In 2004 invented by Jason R. Huggins & team.
2. Original name is JavaScript Functional Tester [JSFT]
3. Open source browser based integration test framework built originally by Thoughtworks
4. 100% Javascript and HTML
5. Designed to make test writing easy
6. Selenium WebDriver launched at Google in 2006
7. In 2008 Selenium WebDriver merged with selenium RC, called as Selenium 2.0

Selenium License:
All selenium projects released under the license of Apache 2.0
Anybody can download and use

iv) Selenium supporting platforms/Environments
a) Application Environment
1) It doesn't support CUI based Application
2) It doesn't support I-tier, II-Tier (Desktop Applications or Windows based Applications)
3) It supports Web Applications
4) Mobile Applications which are having web forms

Web Browsers
1) IE 2) Firefox 3) Chrome 4) Safari 5) Opera ...!

Programming / Scripting Languages
1) PYTHON 2) C# 3) PHP 4) JAVA 5) PERL 6) RUBY 7) JavaScript

v) Selenium Suite of Tools
Block Diagram for Selenium suite:

a) Selenium IDE:
It is Firefox Add on , It is prototyping tool

b) Selenium RC (Remote Control):

It is Client-Server(Two-Tier) Applications:
Features:
1 Import Test Cases from Selenium IDE
2 It supports various browsers (IE, Firefox, Chrome, Safari..)
3 It supports various Programming/Sripting Lang.
4 Random Test execution is possible

c) Selenium WebDriver
1 It is an interface
2 Faster in Test Execution
3 Supports any Programming/Scripting Language(s)

d) Selenium Grid
Selenium Grid 1.0 supports Selenium RC tests only
Selenium Grid 2.0 supports WebDriver tests
1 It is used to grouping Tests
2 It is used execute Tests in parallel

Configure Selenium
1 Download and Install PYTHON
2 Download and Install PYCHARM
3 Download WebDriver Interface
4 Download and install Firebug and Firepath in Mozilla browser
5 Download browser drivers also

```
$pip install -U selenium
$pip show selenium
$pip install urllib3
$pip show urllib3
```

Why to choose Python over Java in Selenium
1. Java programs tend to run slower compared to Python programs.
2. Java uses traditional braces to start and ends blocks, while Python uses indentation.
3. Java is static typing, Python is dynamically typed.
4. Python is simpler and more compact compared to Java.
5. PYTHON Syntax is simple, JAVA Syntax is complex

Syntax:
```
import selenium
```

Syntax:
```
from selenium import webdriver
```

Example:
```
import selenium
print(dir(selenium))
```

Example:
```
from selenium import webdriver
print(dir(webdriver))
```

https://pypi.org/project/selenium/

Example1:To Open a Website
```
from selenium import webdriver
browser = webdriver.Firefox()
```

```
browser.get('http://seleniumhq.org/')
```

Example2: For Facebook Login Test Script:

```
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
user = "ksrajupy@gmail.com"
pwd = "*********"
driver = webdriver.Firefox()
driver.get("http://www.facebook.com")
assert "Facebook" in driver.title
elem = driver.find_element_by_id("email")
elem.send_keys(user)
elem = driver.find_element_by_id("pass")
elem.send_keys(pwd)
elem.send_keys(Keys.RETURN)
driver.close()
```