

# GAME OF THRONES: IMPACT ON U.S. BABY NAMES AND NETWORK ANALYSIS

Project report submitted in partial fulfilment of the  
requirement for the degree of Bachelor of Technology

in

Computer Science and Engineering / Information Technology

By

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Under the supervision of

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To



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# CERTIFICATE

## Candidate's Declaration

We hereby declare that the work presented in this report entitled “**GAME OF THRONES: IMPACT ON U.S. BABY NAMES AND NETWORK ANALYSIS**” in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology in Computer Science and Engineering/Information Technology** submitted in the department of Computer Science & Engineering and Information Technology, Jaypee University of Information Technology, Waknaghat is an authentic record of my own work carried out over a period from August 2015 to December 2015 under the supervision of Dr. Suman Saha, Assistant Professor (SG).

The matter embodied in the report has not been submitted for the award of any other degree or diploma.

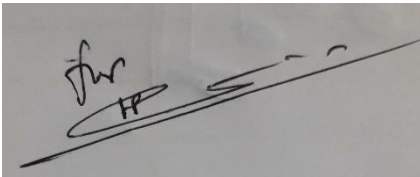


Skund Verma (161249)



Ashish Bhardwaj (161273)

This is to certify that the above statement made by the candidate is true to the best of my knowledge.



(Supervisor Signature)

Supervisor Name: Dr. Suman Saha

Designation: Assistant Professor (SG)

Department name: Computer Science and Engineering

Dated: 16.07.2020

## ACKNOWLEDGEMENT

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Thank you, sir, once again for your support.

Yours sincerely,  
Skund Verma, Ashish Bhardwaj

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# CHAPTER 1: INTRODUCTION

## 1.1 Introduction to project: -

Here we speak to Game of Thrones as a well-known TV arrangement by HBO channel. Round of seats depends on a mainstream book arrangement we call it as "A Song of Ice and Fire". This well-known T.V. arrangement of HBO depends on the celebrated books titled 'Round of seats', which is composed by George R.R. Martin.

Since Game of Thrones was discharged as the incredibly famous TV arrangement, individuals are talking the expressions like "winter is coming" and "valar morghulis" in everyday life and some more. Such expressions have now gone into the dictionary of America. This has made the individuals full fan night appear as it contains loaded with manipulating, phlebotomy, and red-hot mythical beasts which makes the show an astonishing show.

This arrangement of Game of Thrones shows the tale of a common war in medieval occasions of world history in a medieval nation. The arrangement was discharged in April 2011. The arrangement known to be determined to the anecdotal mainlands of Westeros and Essos as we know it where seasons stretch on for a considerable length of time. The genuine story starts as: 10 years in length summer really is on skirt of consummation, and winter is beginning. Since winter is beginning, invented characters fight against one another to guarantee the Throne. The "Fe Throne" is supposed to be a seat of the Seven Kingdoms lord. This system has an exceptional preeminent intensity of having a significance that the seat controls everything except the northern tip of Westeros. Here the expression "sit on the Iron Throne" is utilized as a metonym which is comparable to "rule Westeros" for individuals' better information and reference.

## 1.2 Problem Statement: -

- Problem one:

The issue is to investigate the dataset of the famous T.V. arrangement of HBO, considering the well known books named 'Round of seats'. In this task, we will begin analysing the co-event system of the characters in the Game of Thrones books. We state two characters have co-occurred if their names have showed up in the region of 15 words from one another in the book.

About data:

The Game of seats dataset contains a system and is given as a record portraying the edges between characters, with certain ascribes connected to each edge. We start by stacking into the information for the primary book A Game of Thrones and investigate it.

- Problem two:

In this part, we will investigate how Game of Thrones has enlivened infant names as of late. Here we see some physically picked Game of Thrones characters, and how the fame of their names has ascended alongside their fame on the show.

About data:

Government controlled financial savings Administration made this dataset and this dataset includes all names from Social Security card application for birth that occurred after 1879 within the United States. All the facts are from a cent percent instance of facts on Social Security card packages. To shield protection, the Social Security Administration has limited names to those with in any event 5 occasions.

### 1.3 Objective: -

Popular culture has in every case left an effect on our public. Be it with respect to any form sense like apparel sense, self-appearance sense, self-prepping, or any TV program, music, sports, corporate marking, individual marking, or a film, they all leave an effect on us all. Mainstream society is for the most part observed by individuals from a public as a lot of practices, convictions and articles that leave positive or negative in a general public at a given purpose of time.

Here we have a case of an extremely well-known web arrangement "Round of seats", this arrangement got debuted in April 2011 on HBO. This well-known T.V. arrangement of HBO depends on the well-known books named 'Round of seats' by George R.R. Martin.

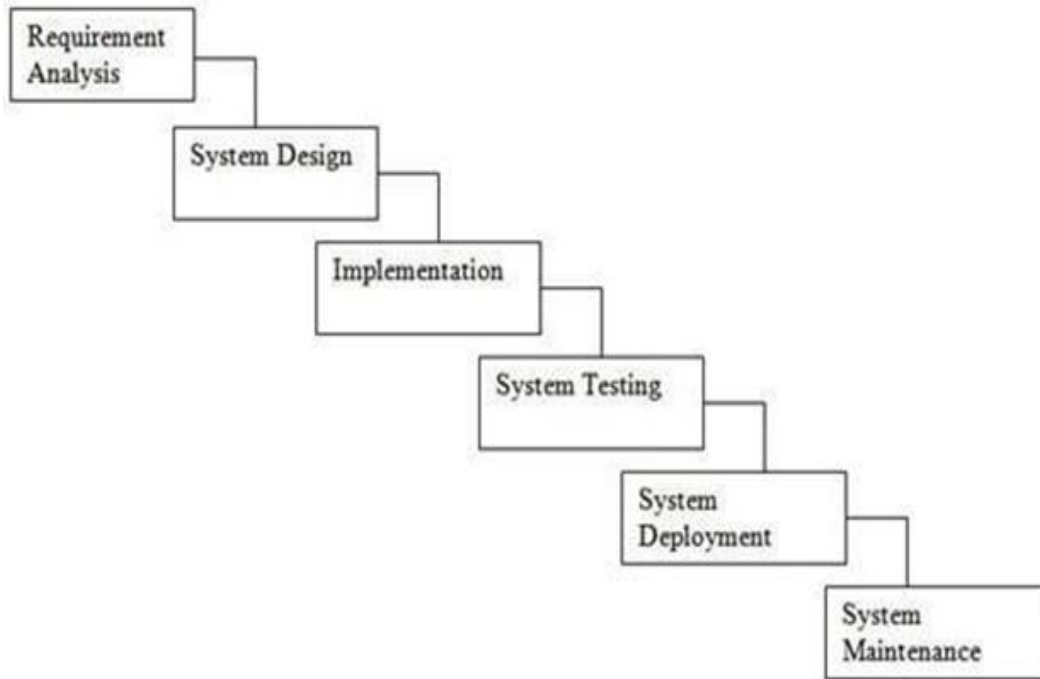
Like it is recently said about the effect on society. This "Round of seats" web arrangement has left an effect on social orders in U.S. so much that individuals have now begun naming their new conceived children based on their characters. Characters in the arrangement show their talking style, their character as a warrior, their insight, their demeanor, their conduct in Game of seats which for the most part leave an effect on individuals. What is more, on such a conviction, that naming such characters to their infants will make them a similar character when they grow up, names are given to them.

So, in this undertaking, the goal is to investigate how names have picked up the notoriety throughout the years. We have taken some Game of Thrones characters physically and have examined how the notoriety of their names has ascended alongside their ubiquity on the show, by means of dataset. Here we will likewise examine the co-event character organize in the Game of Thrones books. We consider two character to co-happen if their names show up in the region of 15 words from one another's in the books.



## 1.4 Methodology: -

Here within the assignment, we have made the assignment based on sequential lifestyles cycle model, also called waterfall version. Waterfall version is the handiest model and it is simple to apprehend and use. In the model, every section must be completed, simplest then we will flow to the subsequent section. There is not any overlapping in the waterfall model.



## CHAPTER 2: LITERATURE SURVEY

### 2.1 About Characters: -

We have chosen some of these characters in Game of thrones for analysis of their popularity in their naames:-

#### Daenerys Targaryen:

Daenerys Targaryen is one of the most popular fictional character in Game of Thrones. Emillia Clarke is playing this role.



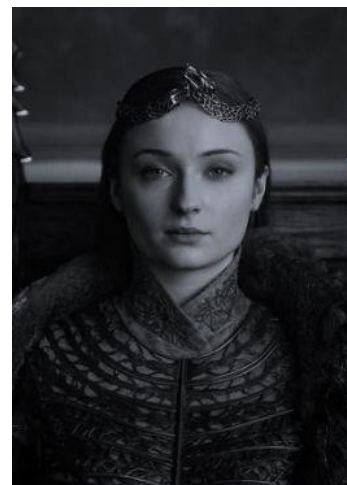
#### Arya Stark:

Arya Stark is a fictional character iska kirdaar Maisie Willialms ne bakoobi nibaya hai.



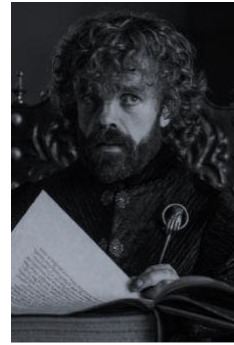
#### Sanas Strark:

Sanas Strark is a fictional character which is played by Sophie Turner.



Tyrion Lannister:

He is an anecdotal character in the A Song of Ice and Fire arrangement of epic dream books and its TV arrangement Game of Thrones. This job is played by Dwindle Dinklage.

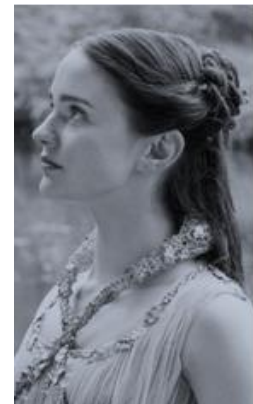


Brienne Tarth is a fictious character in Song of Ice and Fire seriez of fanatasy novel and its web series adaption, Game of Thrones. Brienne Tarth's role is played by Boris Johnson.



Lyanna Stark:

Lyanna Stark was just single little girl little girl of Master Rickard Stark and Lady Lyarra Stark. Lyanna's job is played by both Cordelia Hill (as a kid) in Season 7 and Aisling Franciosi (as a youthful grown-up) during flashbacks Of Season 5 and Season 6 in the TV arrangement Game of Seats.



Meera Reed is an individual from House Reed. In the TV adjustment Game of Thrones, Meera Reed's job is depicted by Ellie Kendrick.



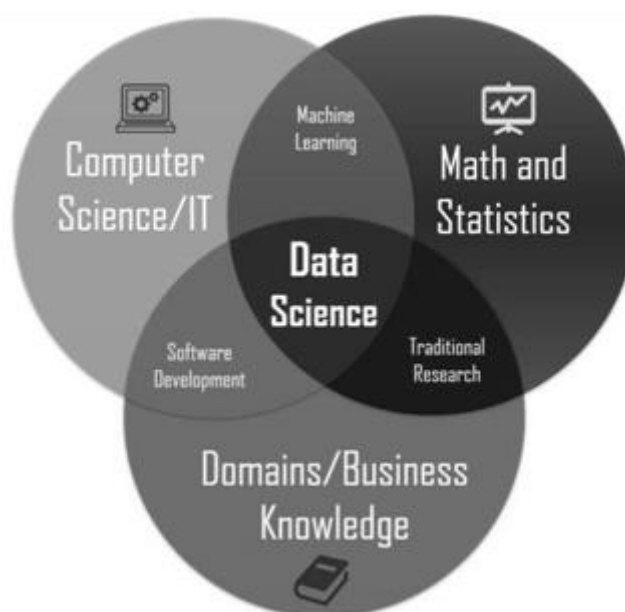
## 2.2 About Data Science: -

As the world entered the period of huge information, the requirement for information stockpiling additionally developed. This was the principle challenge and it turned into the worry for the undertaking ventures till 2010. The primary spotlight was on building system and answers for store information and to process this information.

Data Science comprises of a mix of different instruments, calculations, and AI standards, the objective being to find concealed examples from the crude information.

Data Science develops as an apparatus to search for a progressively forward-looking methodology, an exploratory route alongside the mean to concentrate on breaking down the past or momentum information and to anticipate the future results with the point of settling on educated choices. Data science can react to the open-completed requests concerning "what" and "how" events occur.

In 2012, Harvard Business Review termed Data science as "The hottest erotic Job of the 21st Century", after which articulation "information science" transformed into a famous articulation and spread. Utilizations of Data science is currently regularly utilized conversely with before ideas like business examination, business knowledge, prescient displaying, and measurements.



## 2.3 About Machine Learning: -

More established definition was given "the field of study that enables PCs to learn without being expressly modified."

Present day definition: Machine learning is a use of Artificial insight, where a PC adapts consequently and improves dependent on its experience. We can say a presentation as P, errands as T, experience as E.

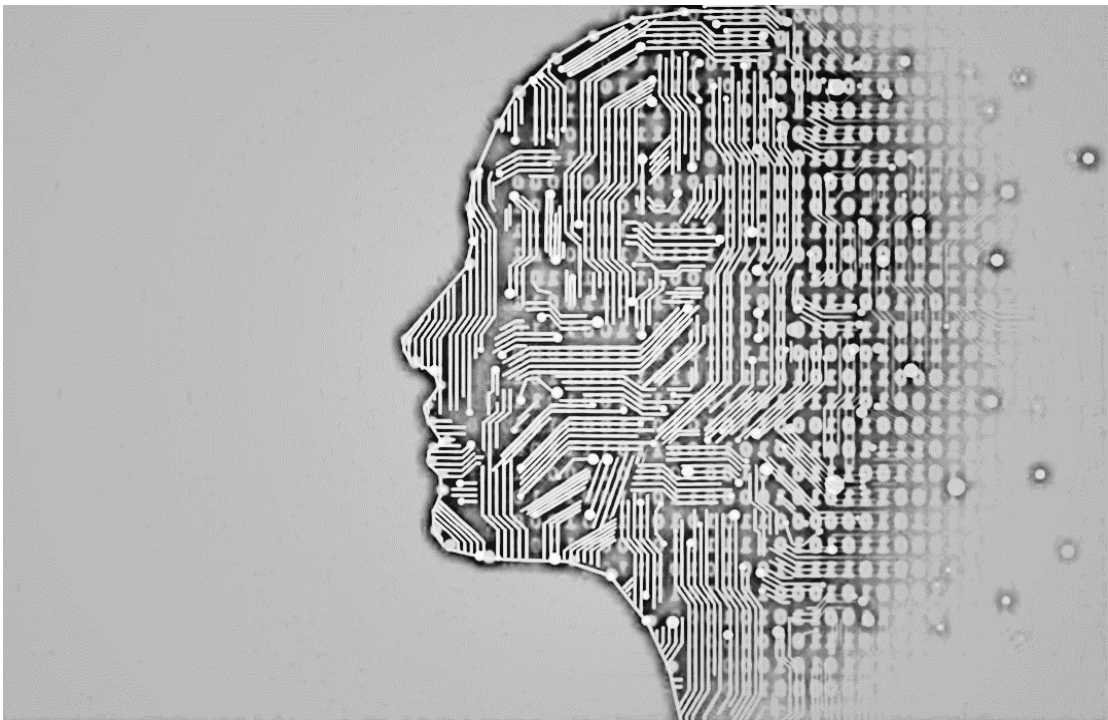
Model: on the off chance that we expect a round of playing checkers, at that point we can say that E as the experience of playing numerous rounds of checkers

T as the assignment of playing checkers.

P as the likelihood that the program will dominate the following match.

As a rule, any AI issue can be grouped into 2 sections: Supervised learning and Unsupervised learning.

In 2012, Harvard Business Review stated Data science as "The hottest erotic Job of the 21st Century", after which the expression "information science" turned into a popular expression and spread. Utilizations of Data science is currently frequently utilized conversely with before ideas like business investigation, business knowledge, prescient demonstrating, and measurements.



## 2.4 About Supervised learning: -

In administered learning, we are given an informational collection. Here we recognize what our right yield ought to resemble, the thought being that there is a connection between the info and the yield.

Managed learning issues can be additionally separated into "relapse" and "arrangement" issues. If we talk about relapse issue, we are attempting to foresee results inside a ceaseless yield, for example that we attempt to plan input factors into some ceaseless capacities. Yet, in an arrangement issue, we are rather attempting to anticipate brings about a discrete yield. At the end of the day, we attempt to plan input factors to numerous discrete classifications.

Model I:

Given information about the size of houses on the land showcase, we attempt to foresee their cost. Value which is a component of size is a ceaseless yield, so it is a relapse issue.

We can change over this model into a grouping issue by crating our yield about if the housing sells for instead of asking cost. This time we arrange the houses dependent on cost to two not continuous categories.

Model II:

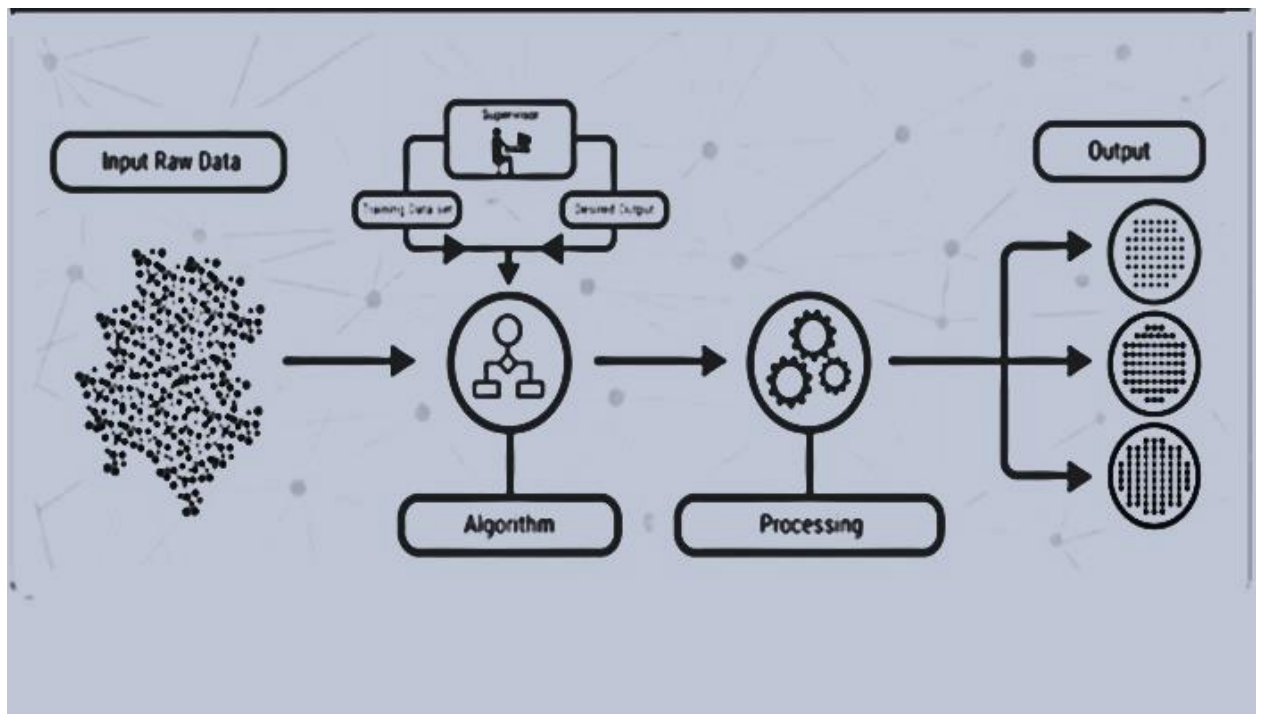
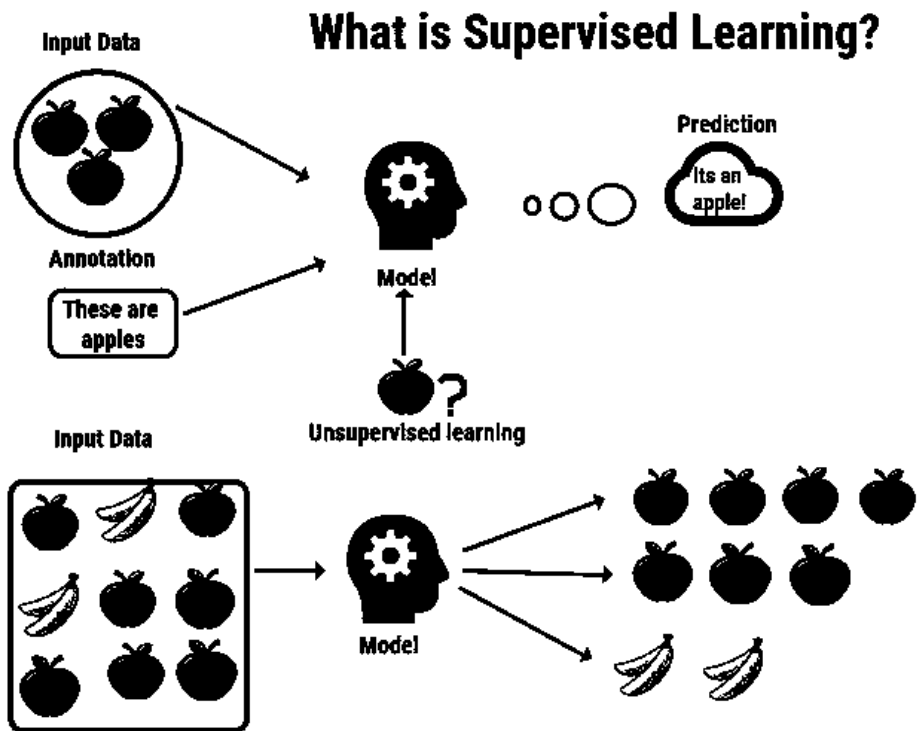
(a) Regression

Provided an image of an individual, it is required to foresee his age.

(b) Classification

For a patient experiencing tumor, we should foresee whether that tumor is dangerous or not.

We have some more models demonstrating regulated learning:



## 2.5 About Unsupervised learning: -

In Unsupervised learning, we are permitted to technique issues with practically zero idea what our outcomes need to appear as. We can get structure from the data in which we do not continually perceive the impact of the factors.

We can infer this shape by methods for bunching the records essentially dependent on dating some of the factors in measurements.

With the solo picking up info on there might be no input dependent on expectation impacts.

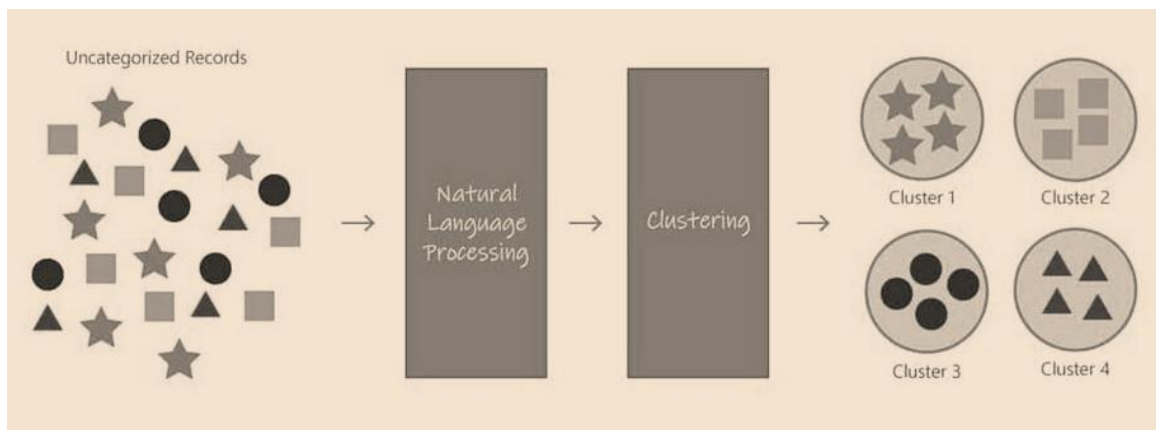
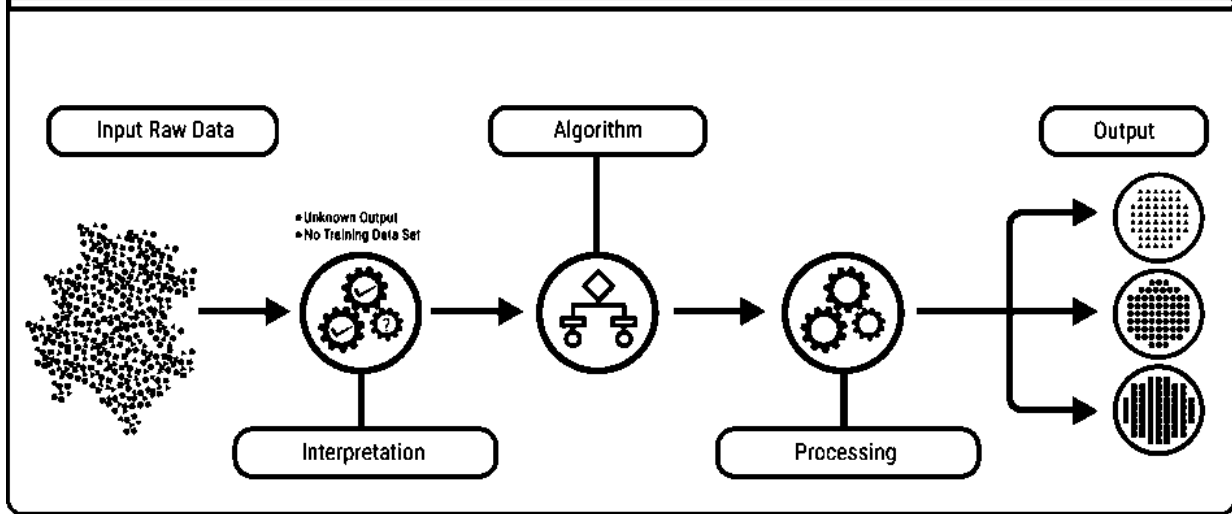
Model:

For Clustering: We assemble as one lakh explicit qualities and find an approach to mechanically amass them into total companies that are comparative by explicit factors.

Non-clustering: The "Blended beverage Party Algorithm", grants us to find structure in a fierce circumstance. (that is, to recognize solitary music and sounds from a work of sounds at a blended beverage party).



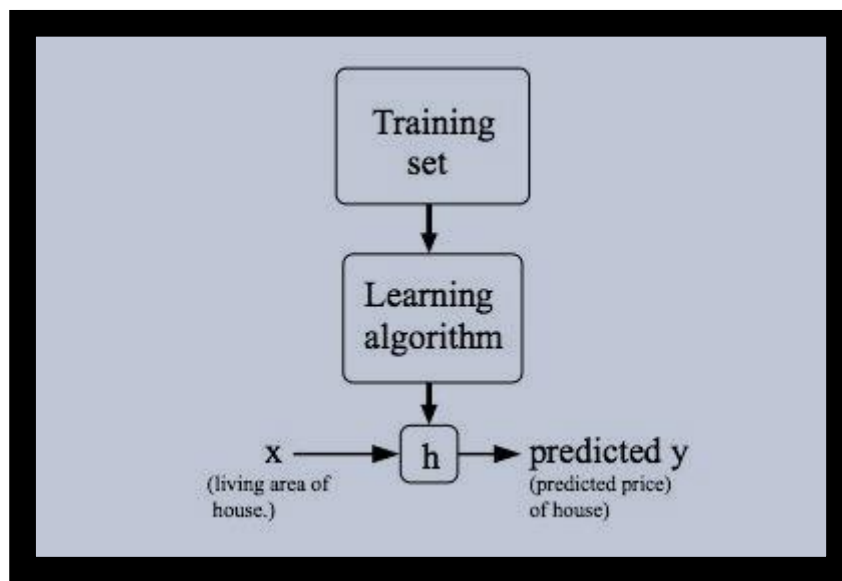
# UNSUPERVISED LEARNING



## 2.6 Model Representation: -

To establish symptoms for similarly use, we are able to use  $x(i)$  to indicate the “enter” variables (residing place in this example), additionally known as enter functions, and  $y^i$  to indicate the “output” or target variable that we are making an attempt to predict (price). A pair of both variables is called schooling example, and the dataset that we can use is a list of  $m$  education examples  $(x(i), y(i))$ ;  $i$  am being 1 to  $m$ . This is known as training set. Here this superscript ( $i$ ) in the notation is absolutely an index into the schooling set. This has none to do with exponentiation. We may also use  $X$  to suggest the space of input values, and  $Y$  to signify the space of output values.

Given a preparation set, we will probably get familiar with a trademark  $h: X \rightarrow Y$  to such an extent that  $h(x)$  is a "fitting" indicator for the relating expense of  $y$ . We name this component  $h$  a theory. On the off chance that we need to see pictorially, the way undoubtedly shows up this:



At the factor when that target variable that we are trying to foresee is ceaseless, as an instance in our lodging version, we do not forget this type of learning problem the relapse difficulty. At the point when  $y$  can take simply few discrete characteristics, (for instance, if, given the residing territory, we had to assume if a domestic is a residence or an apartment, nation), it's far called an association problem.

## 2.7 Cost function: -

We can quantify the exactness of our speculation work by the assistance of a cost work. This cost capacity will take a normal distinction of the considerable number of aftereffects of the speculation with inputs x's and the yield y's.

This capacity is, in another words, called the "Squared mistake capacity", or "Mean squared blunder". The mean is split as an accommodation for the calculation of the slope drop, as the subsidiary term of the square capacity will offset the half term.

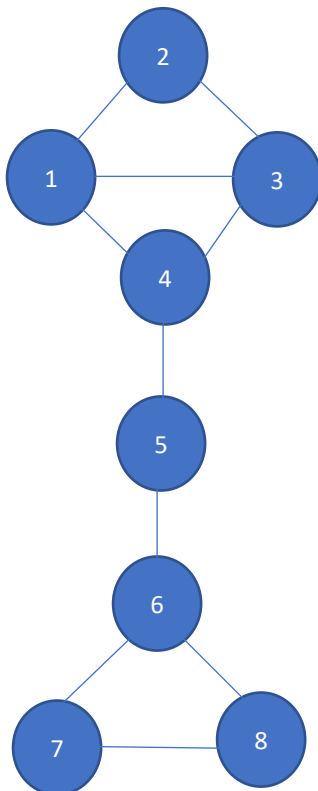
$$J(\theta_0, \theta_1) = \frac{1}{2m} \sum_{i=1}^m (\hat{y}_i - y_i)^2 = \frac{1}{2m} \sum_{i=1}^m (h_{\theta}(x_i) - y_i)^2$$

## 2.8 Centrality of degree: -

Centrality degree is the clearest and the easiest centrality measure to register. We realize that a hub's degree is just a tally of what number of social associations (i.e., edges) it has.

The degree centrality for a hub is known by degree. A hub with its 10 associations would be said a degree centrality of 10, while hub with 1 edge would have a degree centrality of 1.

From the image given below, we can understand the method of finding out degree centrality.



$$\begin{bmatrix} 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \end{bmatrix} \times \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \\ 3 \\ 3 \\ 2 \\ 3 \\ 2 \\ 2 \end{bmatrix}$$

Degree centrality  
Matrix

## 2.9 Betweenness centrality: -

Betweenness centrality is defined as a measure of centrality in a graph based on shortest paths.

Here for every pair of vertices in a connected graph, there exists at least one shortest path between the vertices such that either the number of edges that the path passes through (for unweighted graphs) or the sum of the edges' weights (for weighted graphs) is minimized.

The betweenness centrality for each vertex is then defined as the number of these shortest paths that pass through the vertex.

Here we calculate Betweenness centrality of node 2:

Node 3-> 0:1

Node 3-> 1:1

Node 4-> 0:1

Node 4-> 1:1

Node 5-> 0:1

Node 5-> 1:1

Node 6-> 0:1

Node 6-> 1:1

So betweenness centrality of node 2 is 2:8

For node 3:

Node 4-> 0:1

Node 4-> 1:1

Node 4-> 2:1

Node 5-> 0:1

Node 5-> 1:1

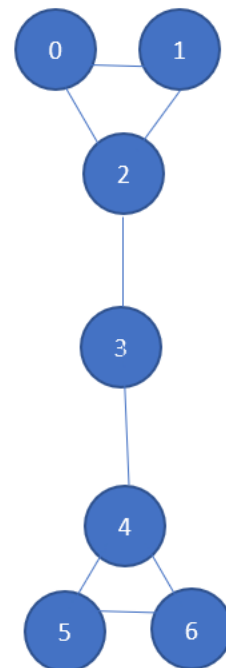
Node 5-> 2:1

Node 6-> 0:1

Node 6-> 1:1

Node 6-> 2:1

So betweenness centrality is 3:9



For node 4:

Node 5-> 0:1

Node 5-> 1:1

Node 5-> 2:1

Node 5-> 3:1

Node 6-> 0:1

Node 6-> 1:1

Node 6-> 2:1

Node 6-> 3:1

So betweenness centrality is 4:8

Betweenness centrality of node 0:0

Betweenness centrality of node 1:0

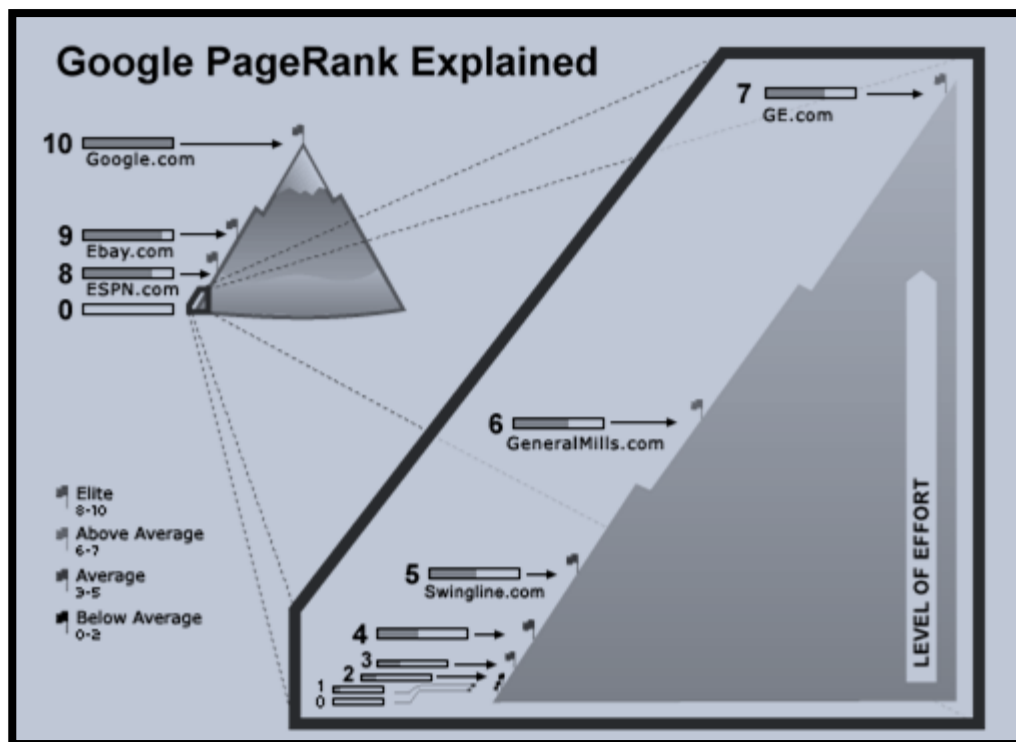
Betweenness centrality of node 5:0

Betweenness centrality of node 6:0

## 2.10 Page Ranking algorithm

PageRank (PR) is a calculation that is used by Goggle Search. It is applied to ranking site pages in their net searcher results. PageRank got named after Larry Page, who transformed into one of the coordinators of Google. PageRank is a procedure for assessing the significance of site online pages.

As indicated by Goggle, Page Ranking estimation works by means of counting the associations of careful wonderful to a site page. This is done to decide a brutal check of ways noteworthy the site is. The major speculation while in transit to be that undeniably progressively huge sites are plausible going to get more associations when appeared differently in relation to extraordinary sites.

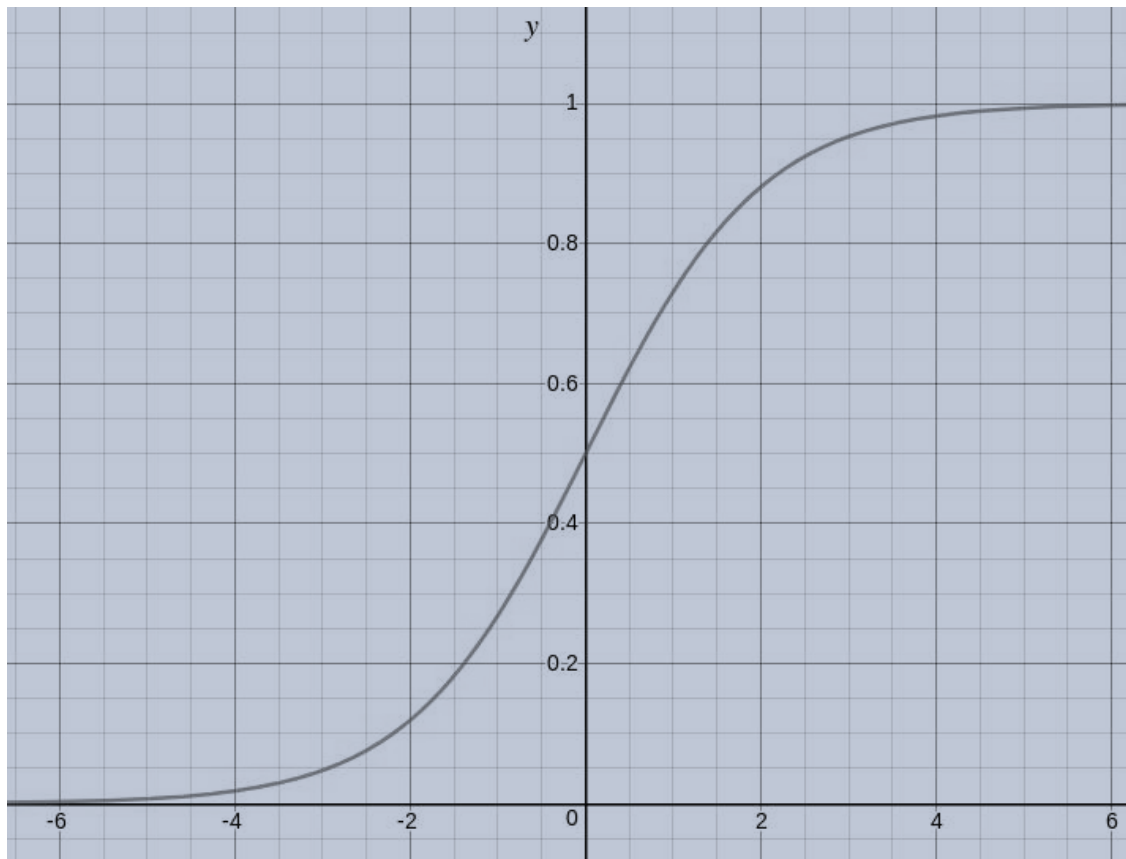


## 2.11 Logistic regression algorithm: -

Logistic regression algorithm or Vital backslide or strategic relapse calculation is a coordinated game plan computation. While in a course of action trouble, the variable goal (or yield) can gain essentially not continuous highlights for given arrangement of features (or data resources) key backslide is a sophomore adaptation. This incredible backslide model desk work a backsliding form to expect the opportunity that a given information segment has a zone with the class numbered as "1". Much like Linear backslide expect that the data is following a promptly potential, Logistic relapse makes the data using a phenomenal capacity known as sigmoid capacity. It is otherwise called key potential.

This is sigmoid function:

$$\text{sigmoid}(x) = \frac{1}{1 + e^{-x}}$$





This is the inference from this graph: sigmoid(x) reaches towards 1 as x reaches  $\infty$ . sigmoid(x) value reaches towards 0 as  $x \rightarrow -\infty$ , and for all values sigmoid(x) value always lies between 0 and 1

Henceforth, the speculation of calculated relapse tends it to restrict the cost work somewhere in the range of 0 and 1. In this manner, straight capacities neglect to speak to it as it can have a worth more noteworthy than 1 or under 0 which is absurd according to the speculation of calculated relapse.

This is the calculated relapse speculation desire:

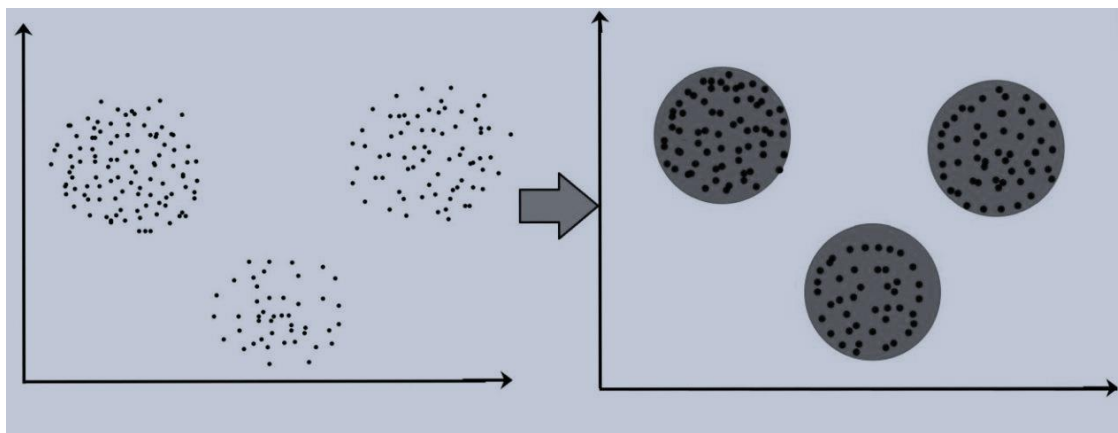
$$0 \leq h_{\theta}(x) \leq 1$$

## 2.12 Clustering algorithm: -

This calculation is basically a kind of solo gaining knowledge of strategy. Solo gaining knowledge of is a method where we draw references from datasets comprising of information without named reactions. Fundamentally it's far applied as a process to find out critical shape, logical hidden procedures, generative highlights, and groupings intrinsic in quite a few models.

Bunching calculation is the assignment of partitioning the populace or records focuses into numerous gatherings with the stop intention that records focuses in comparable gatherings are like different records focusses in a comparable accumulating and diverse to the data focuses in one of a kind gathezrings. This calculation is basically an collection of objects based totally on similitude and divergence among them.

For example The information focuses in the chart given underneath (bunched together) can be ordered into one single accumulasting. We can apprehend those corporations, and may distinguish that there are three bunches within the beneath image.



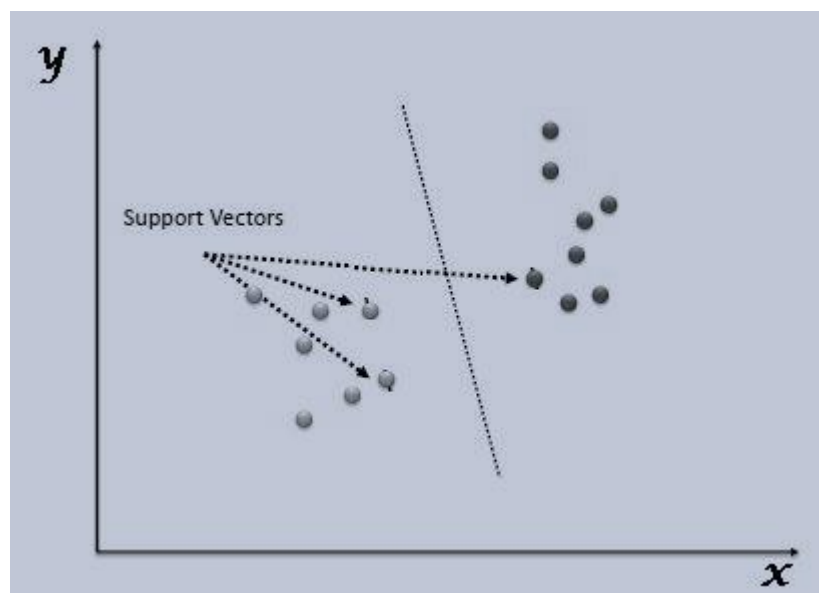
Importance of clustering: -

Bunch clustering has high-quality importance because it decides the inherent accumulating among the unlabelled information gift. There aren't any measures for a first-rate bunching. It relies upon consumer, the rules he may additionally make use of which fulfil his need. For instance, we is probably eager on coming across ID for homogeneous gatherings (facts lower), in discovering "common bunches" and painting their properties ("everyday" data kinds) difficult to understand to us, in locating beneficial and becoming groupings ("precious" records instructions) or in finding unordinary information objects (exception place). This grouping calculation should make a few suspicions that establishes the comparison of focuses and each presumption ought to make top notch and in addition valid bunches.

Another grouping calculation is K-implies bunching calculation. This is the least tough unaided studying calculation that gives the arrangement of grouping trouble. Here K-implies calculation isolates the m perceptions by using okay bunches to such an extent that each and each belief is of the organization with the closest imply that fills in as a version of the bunch.

## 2.13 SVM algorithm: -

Support Vector Machine, or SVM in short structure, is a directed AI calculation which can be utilized for both arrangement or in relapse difficulties. Be that as it may, it is for the most part seen as utilized in order issues. In this SVM calculation, we plot every information thing as a point in a n-dimensional space (where n is number of highlights we have) with the estimation of each element which is the estimation of a specific facilitate. After that we perform characterization by finding the hyper-plane that separate the two classes with no issue (take a gander at the underneath preview).



Support vectors or Support Vectors are basically the co-ordinates of individual observation. Support Vector Machine is basically that best separates the two classes- hyper-plane or line.

Usage in python: In Python, scikit-learn is a library that is broadly utilized for executing AI calculations, SVM calculation is likewise accessible in the scikit-learn library and it follows a similar structure, for example, Import library, object creation, fitting model and expectation.

Pros:

- SVM works truly well with an away from of partition.
- SVM works amazing in high powerful dimensional spaces.
- SVM is ground-breaking in those circumstances where number of estimations are more unmistakable than the amounts of tests.
- SVM uses a small sample of getting ready concentrations in the decision limit, in like manner, called help vectors, so it is furthermore memory profitable.

Cons:

- SVM does not perform incredible, when we have colossal useful assortment why the important getting ready time is higher.
- SVM does not perform well in fact, when the useful assortment has more motivation for instance target combinational sets are concealing.
- This figuring does not genuinely give likelihood approximation; these are well explained utilizing a not cheap five-overlay cross-help.

## 2.14 Correlation: -

Correlation connection is a numerical measurement that quantifies how much two factors move according to one another.

In money related administration, the relationship can be applied to quantify the development of a stock with that of a benchmark file, for instance the Beta.

Utilizations of connections are in cutting edge portfolio the board, which can be registered as the relationship coefficient. The estimation of relationship coefficient must fall between - 1.0 and +1.0.

The recipe for figuring this connection is

$$r = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum(X - \bar{X})^2} \sqrt{\sum(Y - \bar{Y})^2}}$$

where:

r = correlation coefficient

$\bar{X}$  = mean of variable X

$\bar{Y}$  = mean of variable Y

## CHAPTER 3: SYSTEM DEVELOPMENT

### 3.1 Anaconda: -



Annaconda navigator Boa constrictor is an information science stage which is produced for information researchers, IT experts and business pioneers of tomorrow. It is an appropriation of information science programming dialects, for example, Python, R, and so forth.

With in excess of 300 bundles for information science, boa constrictor gets perhaps the best stage for any information science venture.

Annaconda navigator Boa constrictor stage helps in improved bundle the executives and organization. Boa constrictor brings along a wide assortment of instruments to handily gather information from different sources utilizing different AI and AI calculations. It helps in recovering an effectively reasonable condition arrangement which can send any task with the snap of a solitary catch, consequently we can take a shot at that stage without any problem.

Annaconda navigator Boa constrictor is GUI stage working area which accompanies the boa constrictor appropriation. Pilot permits for dispatching apps and oversee boa constrictor bundling, condition, and that too without the use of order line orders. Annaconda navigator Boa constrictor Navigator can perform looking up for investigation activities for bundles on Anaconda Cloud or in a padosi Repository of anaconda. It is given accessibility to linux, windows and mac os working frameworks.

Numerous logical bundles rely upon numerous forms of different bundles, because of which Data researchers' individuals regularly utilize various adaptations of numerous bundles and utilize different conditions to isolate these various variants.

Order line program conda is both a domain administrator and a bundle director, which helps information researchers in guaranteeing that every rendition of each bundle has all the conditions it requires and works accurately.

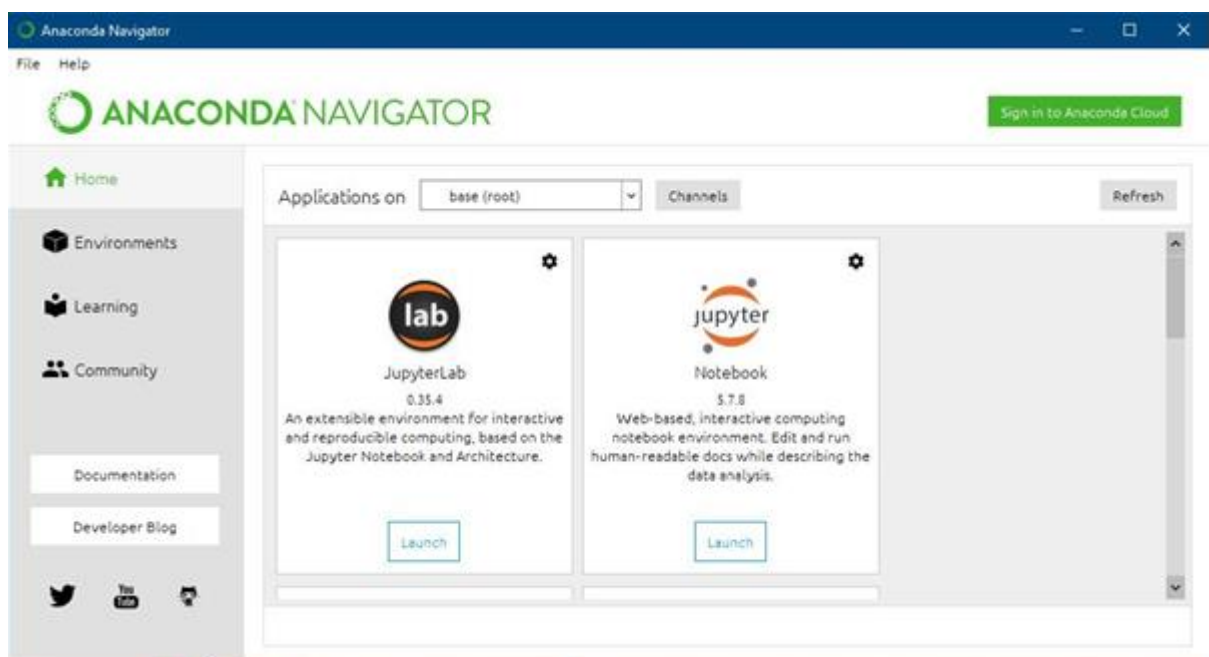
Guide is a simplicity, point and snap approach to work with bundles and situations without expecting to type conda orders in a terminal window. We can utilize it to discover the bundles you need, introduction of them in a domain, nau do gyarah of the bundles, and modifying them – all inside Navigator.

A few applications are accessible as a matter of Navigator course, given underneath:

- JupyterLab, RStudio
- Jupyter Notebook
- Glueviz

We have utilized Jupyter scratch pad application, its subtleties are given in segment 3.2.

To introduce annaconda constrictor we go to <https://www.anaconda.com/distribution/>.





### 3.2 Jupyter notebook: -



Jupyter notebook pad is programming that gives a comfort-based way to deal with open processing in a far reaching new bearing and in another structure, to give an electrical application. This is correct for acquiring the whole process of calculation: improvement, documentation, and program execution, just as results correspondence. This product comprises of:

Web application: A web application is a device dependent on program. It is applied in open writing of archives that all consolidate clarifications, maths instruments, figuring and unadulterated media yield.

Note pad records: This is a lot of all reports that speak to all that content which is obvious in the web application. It has a consideration of all I/p and o/p of the clarifications, maths instruments, estimation and unadulterated media yield.

Here we reveal to some fascinating highlights of this application:

It comprises under-program coding change, alongside auto-language structure space and featuring. It likewise has tab thoughtfulness / consummation.

It can, the program execute code from followed by the aftereffects of computations attached to the code that has made this the special platform.

It shows that the count results by the utilization of introducing unadulterated media, for instance we state HTML or LaTeX or PNG or SVG or possibly some more. For instance, distribution quality figures which is called to give performance by the matplotlib library, it tends to be included incorporation inline.

Jupyter scratch pad has extraordinary office of altering for rich content by the utilization of the markup markdown language. This markup markdown language can give discourse to the programming code, yet this language is not just restricted to the plain content.

It additionally can without much of a stretch incorporate scientific documentation into markdown cells by the best use of LaTeX and processed by MathJax.

About documents of Notebook:

Documents of notebook consists of I/p and o/p of a communicative session in addition to some special extra textual content that is collectively with the code, but it is not intended for executable system. Under this situation, notebook documents come here as a messiah that could function a full calculated document of a session, interleaving executable code with explanatory textual content, arithmetic, and rich representations of resulting items. Such documents are known as internally JSON documents and are stored with the. Ipy nb extension. Because JSON is an undeniable textual content format, these files may be version-managed and shared with colleagues.

Further, any type of paintings, ipynb notebook record may be made available from a public URL. It may be shared via the Jupyter Notebook Viewer (indicating as nbviewer). These offerings represent the report notebook from the familiar far flung locator and structures it as a static net web page, it appears as a web web page to us. So, the results can be despatched in lots of approaches with a associate, or as blog submit in public, without making a compulsion to put in the Jupyter pocket book themselves. So, nbviewer is, in simple phrases, a nbconversion as an internet provider, such that we can perform our own static conversions with nb convert, without dependens of nb viewer.

To start going for walks server of notebook we can use from the command line using this command:

Notebook jupyter

This line will print some info about the server pocketbook in our console, so as to open a web browser to general aid locator of the application web (by means of default <http://127.0.0.1:8888>).

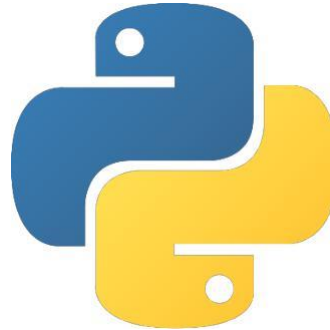
The Jupyter pocketbook internet application's web page, that is referred to as the dashboard, represents all of the notebooks that are at gift area available in the notebook listing.

We can create new notebooks from the dashboard with the assist of New Notebook button, or to open current ones with the aid of clicking on their call. We also can drag and drop. Ipy nb notebooks and wellknown. Py Python supply code documents into that notebook listing vicinity.

When beginning a notebook server from the CMD command line, we can also open a particular notebook immediately, bypassing the dashboard, with the assist of jupyter pocket book `my_notebook.Ipy nb`. This `.Ipy nb` extension is without a doubt assumed if no extension is given.

When interior an open notebook, the File option will open the dashboard in a brand new browser tab, so one can allow us to open another pocket book from the pocket book directory or to create a brand new notebook from starting.

### 3.3 Python: -



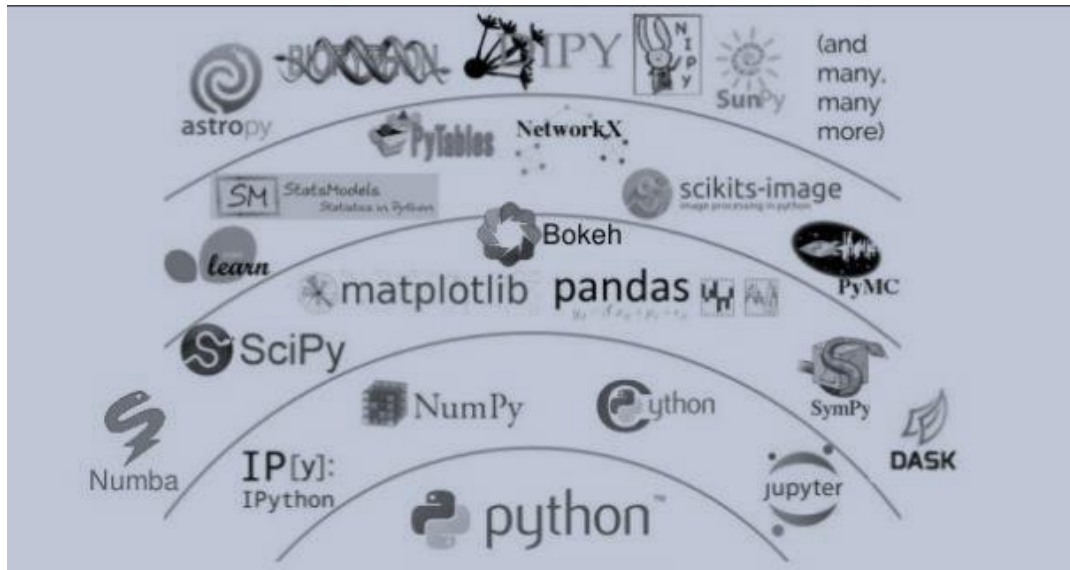
Python is a programming language that is a smooth to examine and its far effective language. It has efficient excessive-level facts structures. It is not simplest an easy but additionally an effective technique to object-orientated programming. Language's fashionable syntax and dynamic typing, alongside its interpreted nature, this makes the language a great remarkable language for scripting and speedy utility development in lots of areas on maximum systems.

Python interpreter and python's sizable significant library are freely available in deliver from or binary form for all critical structures from the Python Web internet page, given as <https://www.Python.Org/>.

This software can be freely allotted. The same net web page additionally consists of distributions of and hints to many free zero.33-birthday celebration Python modules, packages and system, and extra documentation.

The Python interpreter is without difficulty expandable with new capabilities and all records sorts which might be done in C or C++ (or extraordinary languages callable from C). Python is also suitable as an extension language for packages which are customizable.

### 3.4 Python Libraries: -



A module is said to be described as a report with some Python code, and a package is called a directory for sub packages and modules. But this line between a bundle and a Python library is so much blurred.

Python libraries are a reusable bite of codes that we may additionally need to consist of for your packages/projects. In evaluation to languages like C++ or C, Python libraries do not pertain to any context in Python. Here, the term 'library' loosely describes a collection of middle modules. Essentially, then, library is a group of modules. A bundle is defined as a library that may be mounted the use of a package deal manager like rubygems or npm.


If we talk approximately Python Standard Library, it is far a group of specific syntax, token, and semantics of Python. It comes along side middle Python distribution.

Python standard library is written in C and handles capability like I/O and different middle modules. All this operating collectively makes Python the high-quality language it is miles. The heart of the usual library contains greater than two hundred center modules take a seat. This wellknown library ships with Python. But similarly to this popular library, we can also get admission to a developing collection of numerous thousand additives from Python Package Index (PyPI).

Examples of some important python libraries are:

### Pandas:


Pandas is as critical for information-technological know-how as oxygen for survival of frame. This library provides fast, expressive, and bendy facts structures to without difficulty (and intuitively) paintings with established (tabular, multidimensional, potentially heterogeneous) and time-series facts.



The image shows the Pandas logo with the equation  $y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$  and three data visualization icons: a bar chart, a line graph, and a 3D bar chart. Below the logo is a navigation menu with links: [overview](#) // [get pandas](#) // [documentation](#) // [community](#) // [talks](#). The main heading is "Python Data Analysis Library". To the right, under "VERSIONS", it says "Release 0.17.0 - October 2015" with links for [download](#) // [docs](#) // [pdf](#). A short description below the heading states: "pandas is an open source, BSD-licensed library providing high-performance, easy-to-use data structures and data analysis tools for the [Python](#) programming language."

### NumPy

NumPy has a few advanced math capabilities and a rudimentary scientific computing package deal.



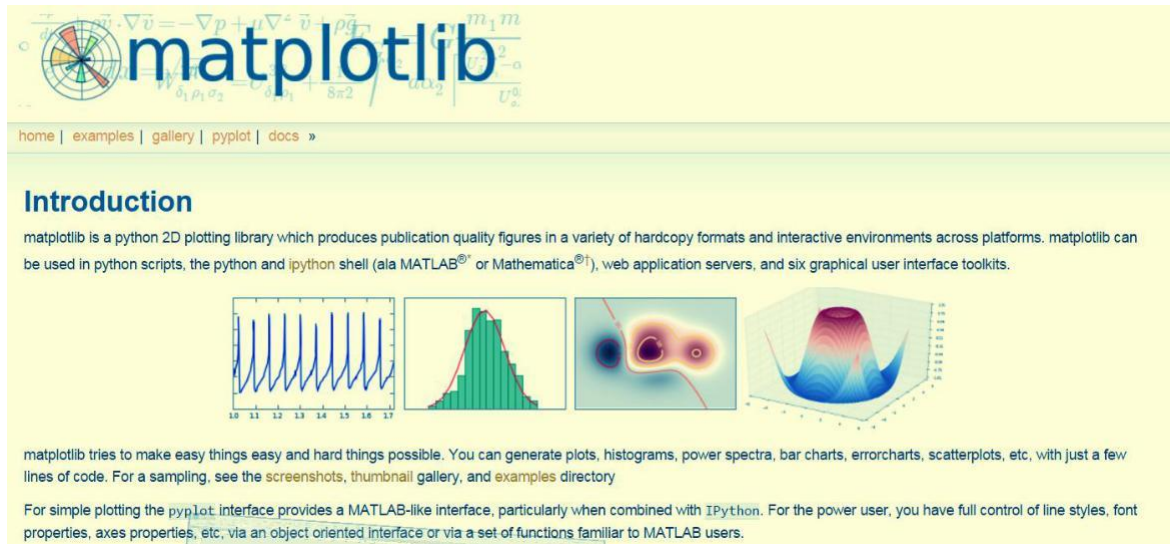
The image shows the NumPy website header with the NumPy logo and the text "NumPy". Below the header is a link to [Scipy.org](#). The main heading is "NumPy". The introductory text says: "NumPy is the fundamental package for scientific computing with Python. It contains among other things:" followed by a bulleted list: 

- a powerful N-dimensional array object
- sophisticated (broadcasting) functions
- tools for integrating C/C++ and Fortran code
- useful linear algebra, Fourier transform, and random number capabilities

Below the list, it says: "Besides its obvious scientific uses, NumPy can also be used as an efficient multi-dimensional container of generic data. Arbitrary data-types can be defined. This allows NumPy to seamlessly and speedily integrate with a wide variety of databases." At the bottom, it says: "Numpy is licensed under the [BSD license](#), enabling reuse with few restrictions."

## Matplotlib:

The matplotlib library allows with records analyzing, and it is far a numerical plotting library.



The image shows the top portion of the Matplotlib website. At the top left is a circular logo with mathematical symbols. To its right is the word "matplotlib" in a large, blue, sans-serif font. Below the logo and text is a navigation bar with links: "home | examples | gallery | pyplot | docs". Below the navigation bar is a section titled "Introduction" in blue. The text below the title reads: "matplotlib is a python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. matplotlib can be used in python scripts, the python and ipython shell (ala MATLAB<sup>®</sup> or Mathematica<sup>®</sup>), web application servers, and six graphical user interface toolkits." Below this text are four small thumbnail images: a line plot with multiple overlapping curves, a histogram with a red normal distribution curve overlaid, a 2D contour plot with two peaks, and a 3D surface plot. Below the thumbnails is more text: "matplotlib tries to make easy things easy and hard things possible. You can generate plots, histograms, power spectra, bar charts, errorcharts, scatterplots, etc. with just a few lines of code. For a sampling, see the screenshots, thumbnail gallery, and examples directory" and "For simple plotting the pyplot interface provides a MATLAB-like interface, particularly when combined with IPython. For the power user, you have full control of line styles, font properties, axes properties, etc. via an object oriented interface or via a set of functions familiar to MATLAB users."

## matplotlib.pyplot

Matplotlib.Pyplot includes a collection of command fashion features that make matplotlib work like a MATLAB software program. Each pyplot characteristic modifies some change to a determine, as an example: growing a discern, growing a plotting place in a determine, plotting a few traces in a plotting place, redecorating the plot with labels, etc.

In this matplotlib.Pyplot many states are preserved across characteristic calls, in order that this feature maintains record of things just like the cutting-edge determine and plotting vicinity, and the plotting capabilities are plotted to the contemporary axes ("axes" right here refers to the axes part of a discern and now not the strict mathematical term for more than one axis).

## tabulate

If you need to create a few tables from a python listing, we are able to use the tabulate module, it can generate the table easily in textual content mode and in many formats, than we will beyond it into markdown, wiki files or add the print model on your python CLI if you want to deliver a lovely output to the CLI customers.

The foremost use cases of the tabulate library are:

- To print small tables without problem: just one feature call, formatting is guided via the information itself
- To authorize tabular facts for lightweight simple-textual content markup: a couple of output formats appropriate for further enhancing or transformation
- For readable presentation of mixed textual and numeric information: clever column alignment, configurable wide variety formatting, alignment by way of a decimal point

## bq\_helper

BigQuery\_Helper is a helper elegance this is used to simplify not unusual read-most effective BigQuery obligations. It makes our paintings easy to execute queries at the same time as we are learning SQL, and also provides a handy stepping stone on the course to using the center BigQuery python API.

The syntax is: `from bq_helper import BigQueryHelper`



## CHAPTER 4: PERFORMANCE ANALYSIS

### Dataset (Impact on US Baby names):

The Social Security Administration made this open dataset. It comprises of all together names from applications of Social Security card for birthhs that went off inside the United States after 1879. We must see that numerous people brought into the world sooner than 1937 in no way, shape or form executed for a Social Security card, so their names do not incorporate in this measurement. For the ones who followed, data may or will not show the area of starting, and again their names do no longer incorporate in the data.

All statistics in facts are from a 100% pattern of information on Social Security card programs as according to stop of February 2015. For shield, Social Security Administration restricts names to people with as a minimum 5 occurrences.

The dataset contains the year in which the no of occurrences for a specific name were counted, the gender, that specific name and number of occurrences.

Number of rows: 604055

Number of columns: 5

Column names: {S. No., Year, Gender, Name, count }

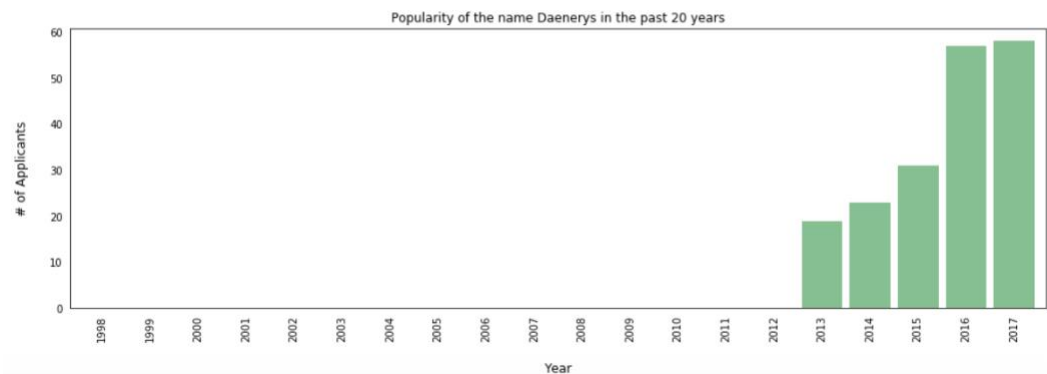
This dataset contains the serial number, the year in which the no of occurrences for a specific name were counted, the gender, that specific name and number of occurrences (count).

We have taken the screenshot of the database

1		year	gender	name	count
2	0	1911	M	Waverly	6
3	1	1910	F	Hildegarde	13
4	2	1913	M	Tadashi	9
5	3	1913	F	Hilma	11
6	4	1910	F	Lettie	71
7	5	1910	F	Caroline	518
8	6	1912	F	Patricia	482
9	7	1914	F	Louie	22
10	8	1911	F	Katy	7
11	9	1912	M	Domenic	46
12	10	1913	F	Willie	2238
13	11	1914	F	Delores	149
14	12	1912	F	Reva	82
15	13	1914	M	Fermin	9
16	14	1914	F	Juliana	21
17	15	1912	F	Corinne	199
18	16	1911	F	Winnie	212
19	17	1911	M	Sylvester	166

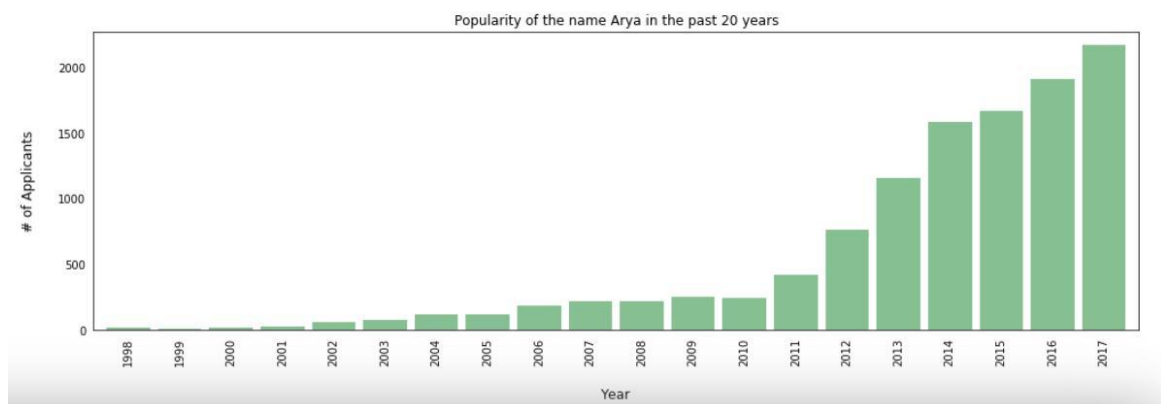
## Analysing the outputs:

Daenerys Targaryen:



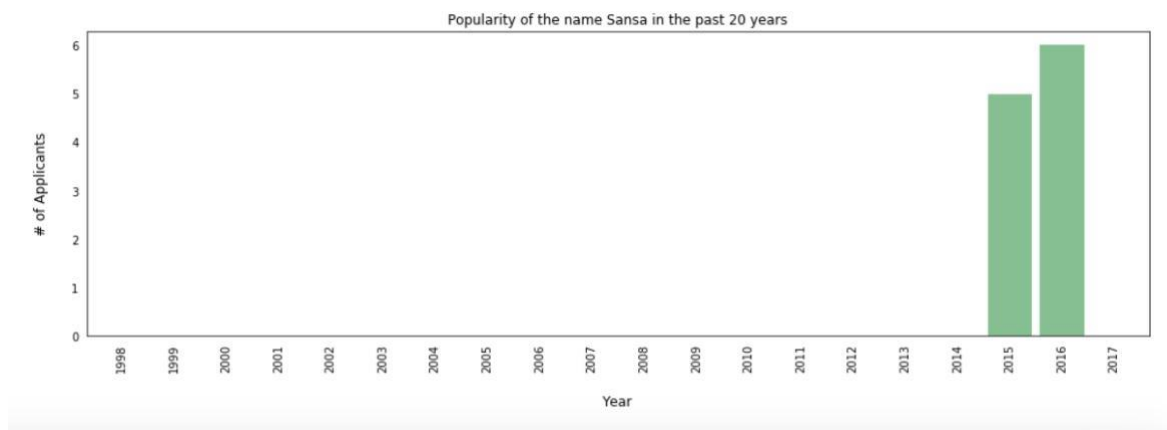
- This graph shows that about 20 children were named Daenerys in 2013
- The name Daenerys has never appeared in the data base before. It clearly indicates that the parents were inspired by the Game of Thrones character, who emerges as a clear protagonist on the show in season 3, which was released in 2013.
- It is also interesting to see that about 60 children were given the name Daenerys in the year 2016 and 2017.

Arya Stark:



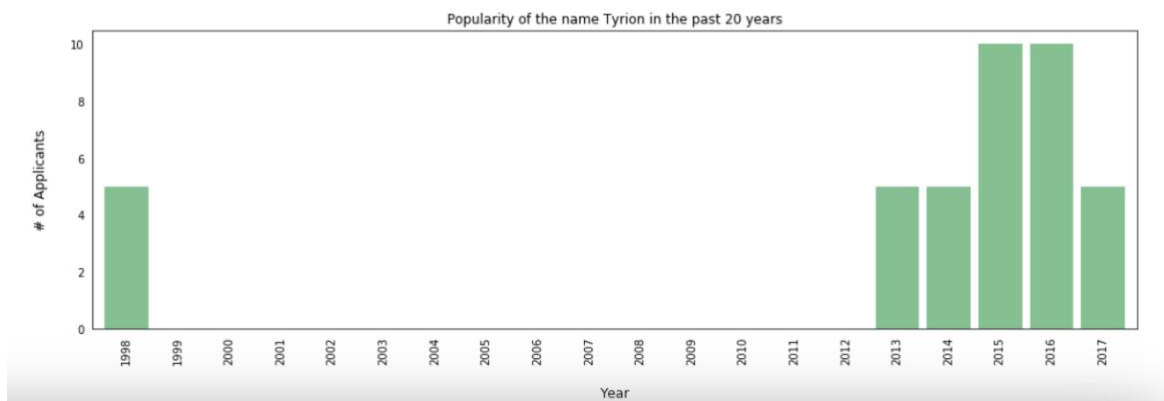
From this graph, we observe above how the popularity of the name Arya shoots up between 2011 to 2017, during which the character on the show transforms from a water dancer to a faceless woman. The popularity shot up from the year 2011.

Sansa Stark:



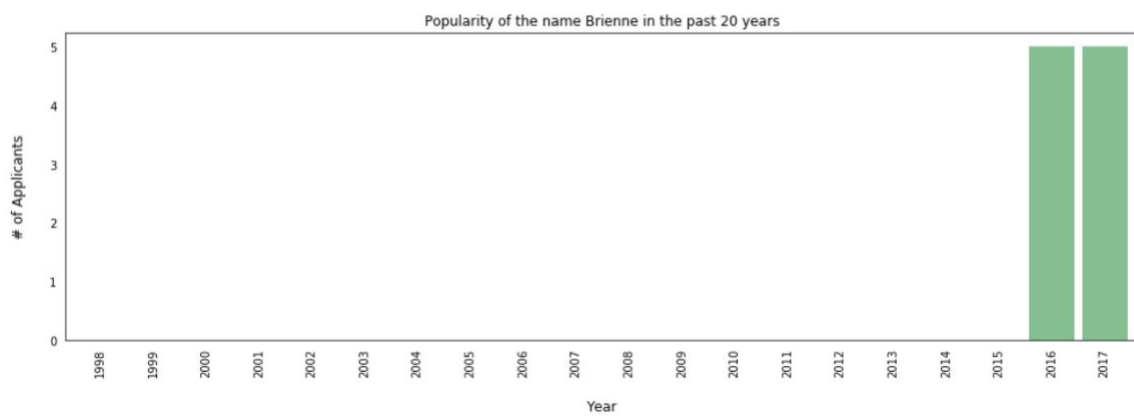
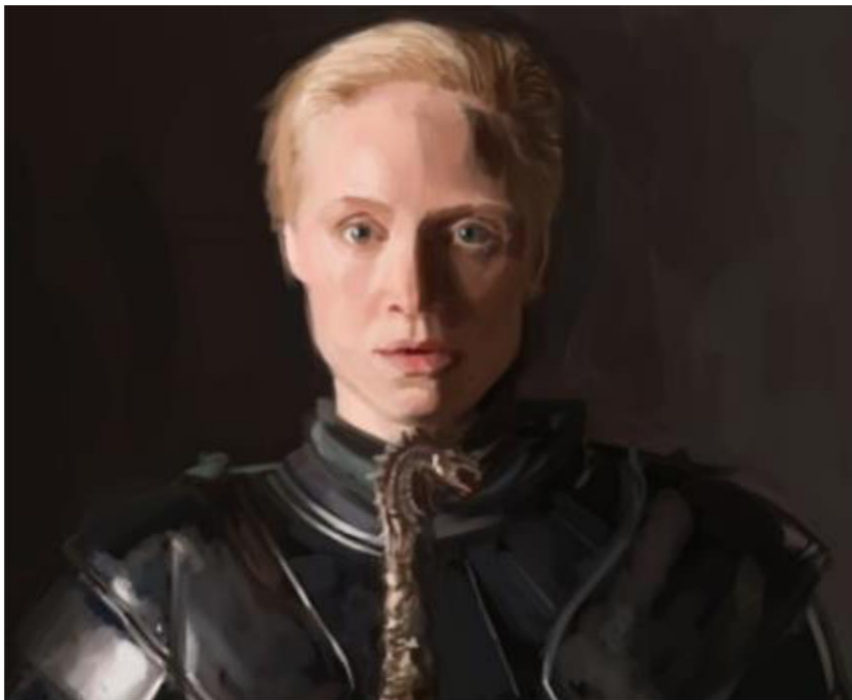
We can see from this graph that while in the initial few seasons, audiences found Sansa Stark's character largely annoying, she established as a legitimate player in the game by seasons 5-6. Thus, her name popularity was seen in the year 2015 and 2016.

Tyrion Lannister:



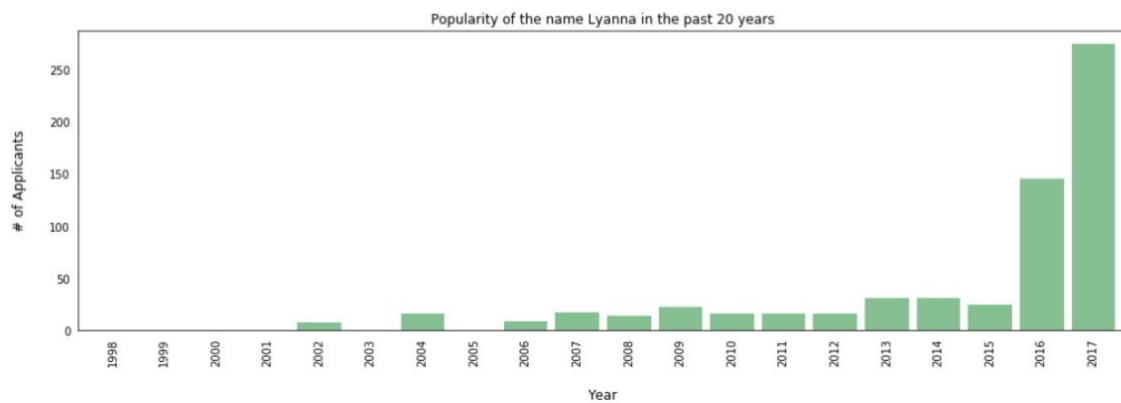
From this graph, we can see that the counting of names has remained constant. They have neither been continuously increasing or decreasing, nor they have earned much popularity. The counting has been 5 in the year of 1998, then in 2013 and 2014. But then in 2015 and 2016, the counting doubled. And then in 2017, the counting again reached to 5.

Brienne Tarth:



From this graph, we can see that the name "Brienne" appears in the database for the first time in 2016, with 5 children named Brienne in year 2016 and 2017, so it didn't gain that much popularity.

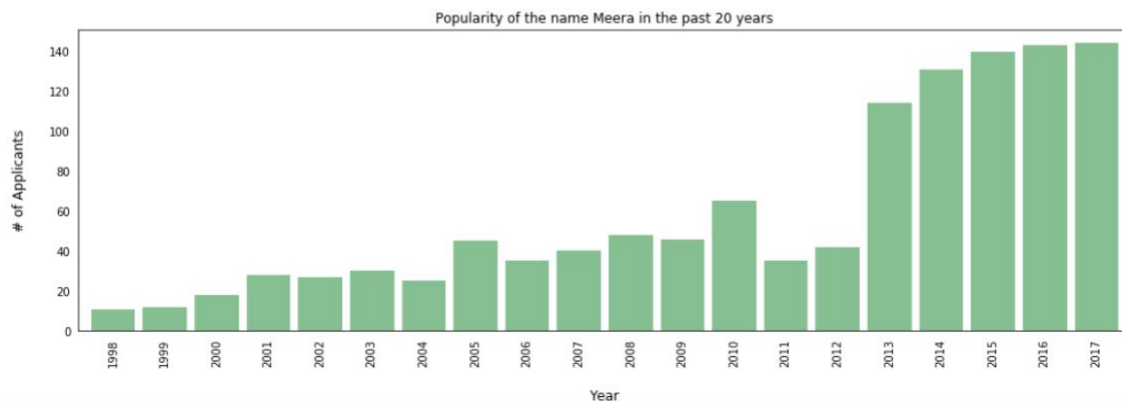
Lyanna Stark:



From the graph, we can see that the name Lyanna's popularity skyrockets up in popularity in the year 2016. This is the 2016 year that season 6 was aired, which ends with a possible revelation of Jon Snow's true heritage. And then in year 2017, the counting further rose up.



Meera Reed:



From this graph, we can see that the popularity of the name Meera was realised in the year 2013, the year when season 3 was aired. In this season, Meera's prominent role was to be seen on screen.

## Dataset (Network analysis):

This dataset contains following columns:-

Source :- The first character

Target :- Characters that have occurred in vicinity of the source

Type :- Whether the edge is undirected or directed

Weight :- No. of times the occurrence has co-occurred in the vicinity of 15 words

Book :- Version of book in which this co-occurrence has happened

The dataset constitutes a network and it's miles given as a textual content file describing edges between characters, in conjunction with a few attributes attached to every aspect.

Some screenshots that we have taken:

	Source	Target	Type	weight	book
0	Addam-Marbrand	Jaime-Lannister	Undirected	3	1
1	Addam-Marbrand	Tywin-Lannister	Undirected	6	1
2	Aegon-I-Targaryen	Daenerys-Targaryen	Undirected	5	1
3	Aegon-I-Targaryen	Eddard-Stark	Undirected	4	1
4	Aemon-Targaryen-(Maester-Aemon)	Alliser-Thorne	Undirected	4	1

	Source	Target	Type	weight	book
0	Aegon-I-Targaryen	Harren-Hoare	Undirected	4	2.0
1	Aegon-I-Targaryen	Nan	Undirected	3	2.0
2	Aegon-I-Targaryen	Rhaenys-Targaryen	Undirected	4	2.0
3	Aegon-I-Targaryen	Tyrion-Lannister	Undirected	3	2.0
4	Aegon-I-Targaryen	Visenya-Targaryen	Undirected	3	2.0

## Analysing the outputs:

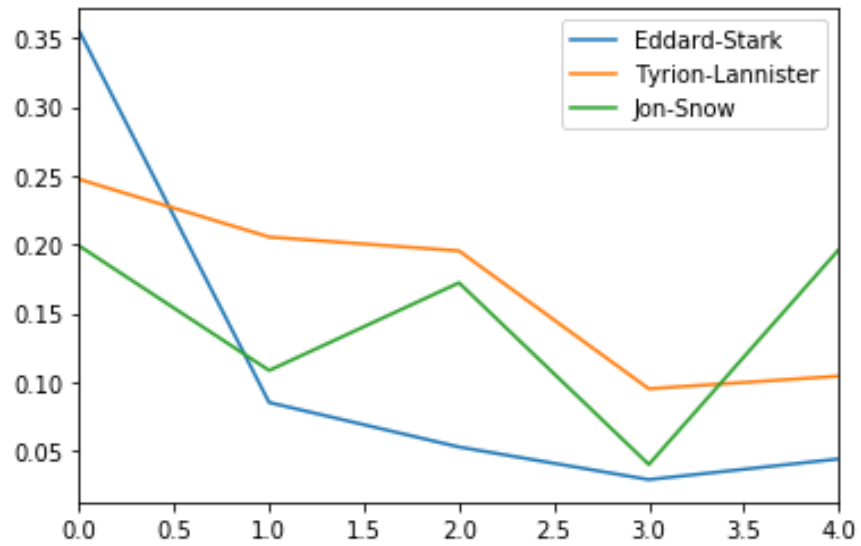
Most important character in Game of Thrones:

```
[('Eddard-Stark', 0.3548387096774194), ('Robert-Baratheon', 0.2688172043010753), ('Tyrion-Lannister', 0.24731182795698928), ('Catelyn-Stark', 0.23118279569892475), ('Jon-Snow', 0.19892473118279572), ('Robb-Stark', 0.18817204301075272), ('Sansa-Stark', 0.18817204301075272), ('Bran-Stark', 0.17204301075268819), ('Cersei-Lannister', 0.16129032258064518), ('Joffrey-Baratheon', 0.16129032258064518)]
```

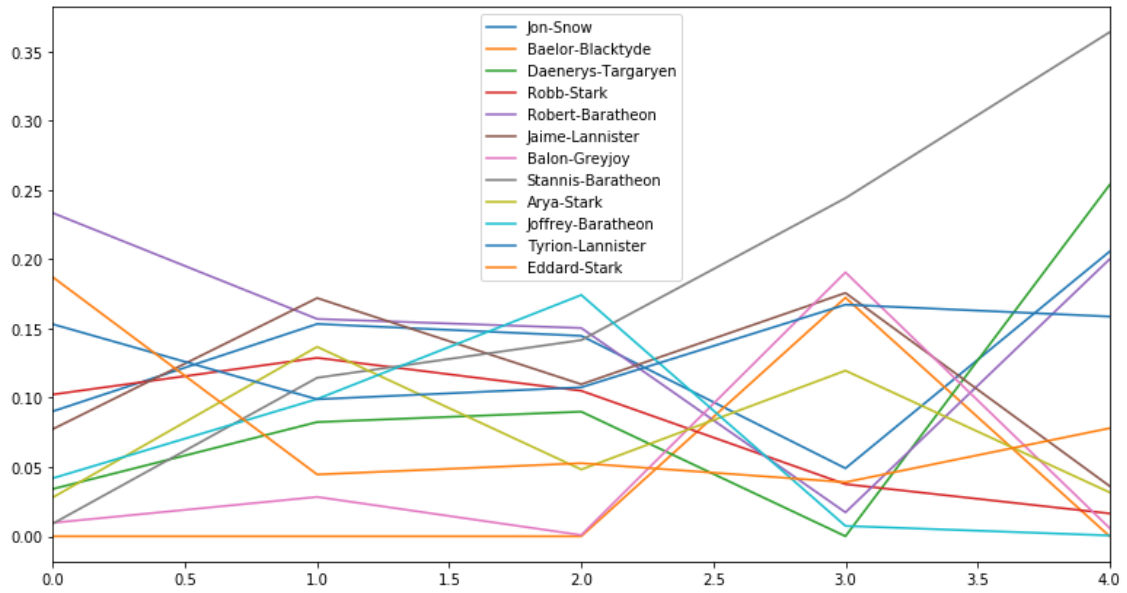
```
[('Jon-Snow', 0.1962025316455696), ('Daenerys-Targaryen', 0.18354430379746836), ('Stannis-Baratheon', 0.14873417721518986), ('Tyrion-Lannister', 0.10443037974683544), ('Theon-Greyjoy', 0.10443037974683544), ('Cersei-Lannister', 0.08860759493670886), ('Barristan-Selmy', 0.07911392405063292), ('Hizdahr-zo-Loraq', 0.06962025316455696), ('Asha-Greyjoy', 0.056962025316455694), ('Melisandre', 0.05379746835443038)]
```

## Evolution of degree centrality

Out[21]: <matplotlib.axes.\_subplots.AxesSubplot at 0x24afa44f708>

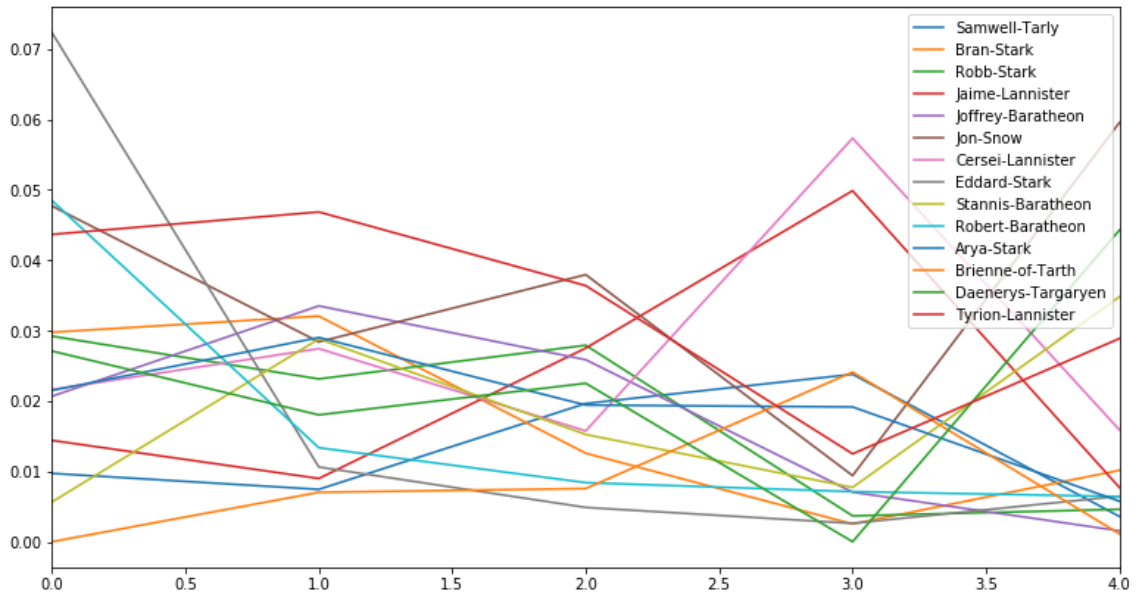


## Plotting the evolution of betweenness centrality



## Applying Page rank algorithm

Out[7]: <matplotlib.axes.\_subplots.AxesSubplot at 0x2303f6a4518>



## Correlation between different measures

Out[8]:

---

	<b>0</b>	<b>1</b>	<b>2</b>
<b>0</b>	1.000000	0.793372	0.971493
<b>1</b>	0.793372	1.000000	0.833816
<b>2</b>	0.971493	0.833816	1.000000

## CHAPTER 5: CONCLUSIONS

While working on this project, we got to know about the use of machine learning algorithms. We understood about the datasets. And from the graphs that came out as output, we were able to analyse how the names have gained the popularity and impacted the society.

While in community evaluation, we have visible a high correlation between the three measures: degree centrality, betweenness centrality and page ranking set of rules for our person co-prevalence network.

So, we have been searching at exceptional ways to find the critical characters in the Game of Thrones co-incidence network. According to degree centrality, Eddard Stark is the maximum crucial man or woman first within the books.

Still the work does not end here, as it would be further interesting to analyse the impact of other popular culture phenomenon such as Avengers on the popularity of names, as they too leave an impact on the society. Also, we can analyse the network in these popular culture phenomena.

The characters of Game of Thrones were chosen from our memory. We may have missed out some important characters that show a popularity trend. To avoid this, instead of manually looking for character names, it would be better that we could use the Game of Thrones data set, which is available on Kaggle, so that we can search for the character names in this dataset.



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<https://www.geeksforgeeks.org>

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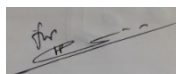
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