

Introduction to Machine Learning

By

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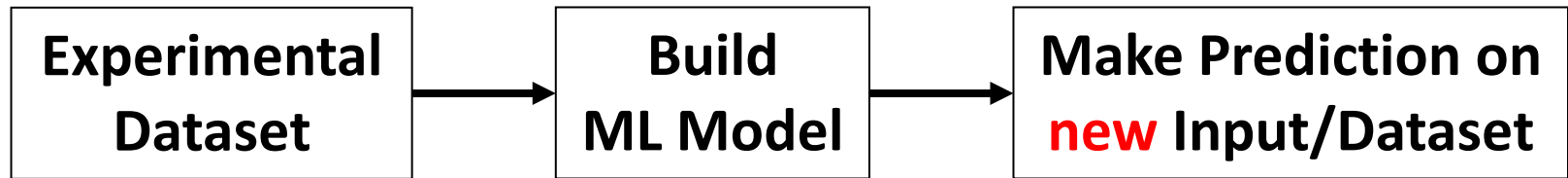
Lets Start

What is Machine Learning ?

Explore

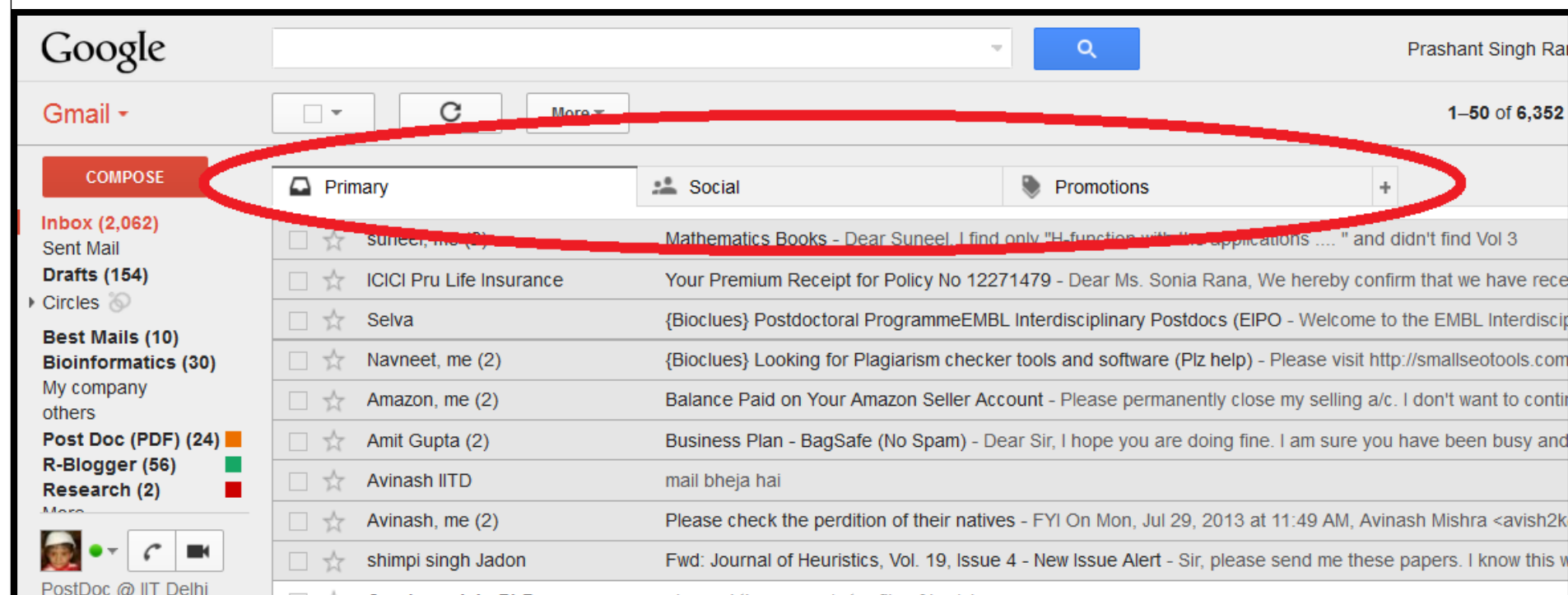
- Go to google and search for “**Teachable Machine**”
or
- Click on “<https://teachablemachine.withgoogle.com>”

Basic Idea for ML



What is Machine Learning ?

Example1: email classification in Gmail



What is Machine Learning ?

Example2: suggestion in youtube

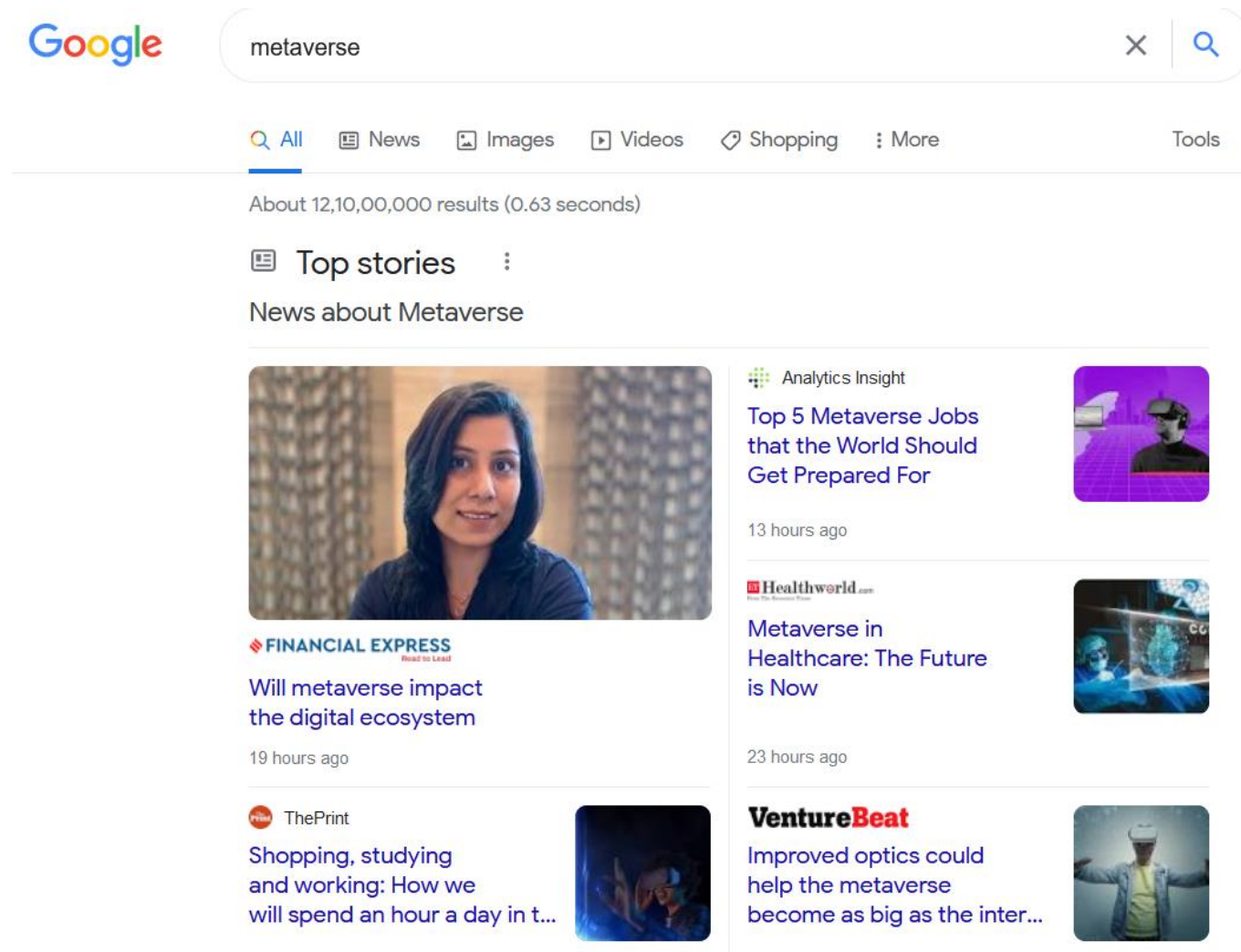
The screenshot shows a YouTube interface. The main video is titled "Mohammed Rafi Superhit Song Collection - Volume 1" with a duration of 33:40. The channel is "Filmi Gaane" with 3,013 videos and 422,121 subscribers. The video has 495 likes and 128 dislikes. The description lists songs: "Dil Deke Dekho 0:00:06", "Dil Ka Bhanwar Kare Pukar 0:04:21", and "Hum Bekhudi Mein Tumko 0:08:51". The artist is "Mohammed Rafi".

A red box highlights a list of suggested videos on the right side of the page:

- Mohammed Rafi Superhit Song Collection - Volume 2** by Filmi Gaane, 124,089 views, 34:28 duration.
- Best of Mohammad Rafi Songs - Part 2 - Mohd. Rafi Top 20 Hit Songs** by Filmi Gaane, 215,129 views, 1:27:11 duration.
- Best of Mohammad Rafi Songs - Part 1 - Mohd. Rafi Top 20 Hit Songs** by Filmi Gaane, 573,036 views, 1:23:54 duration.
- Rajesh Khanna Superhit Song Collection - Volume 1** by Filmi Gaane, 1,198,385 views, 40:31 duration.
- Mohammed Rafi and Lata Mangeshkar Songs - Part 2/3 (HQ)** by Bolly Hitter, 477,555 views, 2:02:39 duration.
- Best of Rajesh Khanna (HQ)** by Bolly Hitter, 1,932,452 views, 1:44:59 duration.
- Mohammed Rafi Award Winning Songs (HQ)** by Bolly Hitter, 409,112 views, 27:17 duration.
- Best of Kishore Kumar [Jukebox] - Part 2/2 (HQ)** by Bolly Hitter.

What is Machine Learning ?

Example3: Google News → Search for “Metaverse”



The image is a screenshot of a Google News search results page for the term "metaverse". At the top, the Google logo is on the left, and the search bar contains the word "metaverse" with a clear (X) button and a search (magnifying glass) button. Below the search bar, navigation tabs include "All", "News", "Images", "Videos", "Shopping", and "More". The "All" tab is selected. The results section shows "About 12,10,00,000 results (0.63 seconds)". Under the heading "Top stories", there is a sub-heading "News about Metaverse". The results are displayed in a grid. The first result is from FINANCIAL EXPRESS, titled "Will metaverse impact the digital ecosystem", with a thumbnail of a woman and a timestamp of "19 hours ago". The second result is from Analytics Insight, titled "Top 5 Metaverse Jobs that the World Should Get Prepared For", with a thumbnail of a person wearing a VR headset and a timestamp of "13 hours ago". The third result is from Healthworld.com, titled "Metaverse in Healthcare: The Future is Now", with a thumbnail of a person in a VR environment and a timestamp of "23 hours ago". The fourth result is from ThePrint, titled "Shopping, studying and working: How we will spend an hour a day in t...", with a thumbnail of a person in a VR environment.

Google

metaverse


× 🔍


🔍 All 📰 News 🖼️ Images ▶ Videos 🛒 Shopping ⋮ More Tools


About 12,10,00,000 results (0.63 seconds)


📰 Top stories ⋮


News about Metaverse

 **FINANCIAL EXPRESS**
Road to Lead
Will metaverse impact the digital ecosystem
19 hours ago

 **Analytics Insight**
Top 5 Metaverse Jobs that the World Should Get Prepared For
13 hours ago

 **Healthworld.com**
Read The Research Report
Metaverse in Healthcare: The Future is Now
23 hours ago

 **ThePrint**
Shopping, studying and working: How we will spend an hour a day in t...

 **VentureBeat**
Improved optics could help the metaverse become as big as the inter...

What is Machine Learning ?

Some more examples

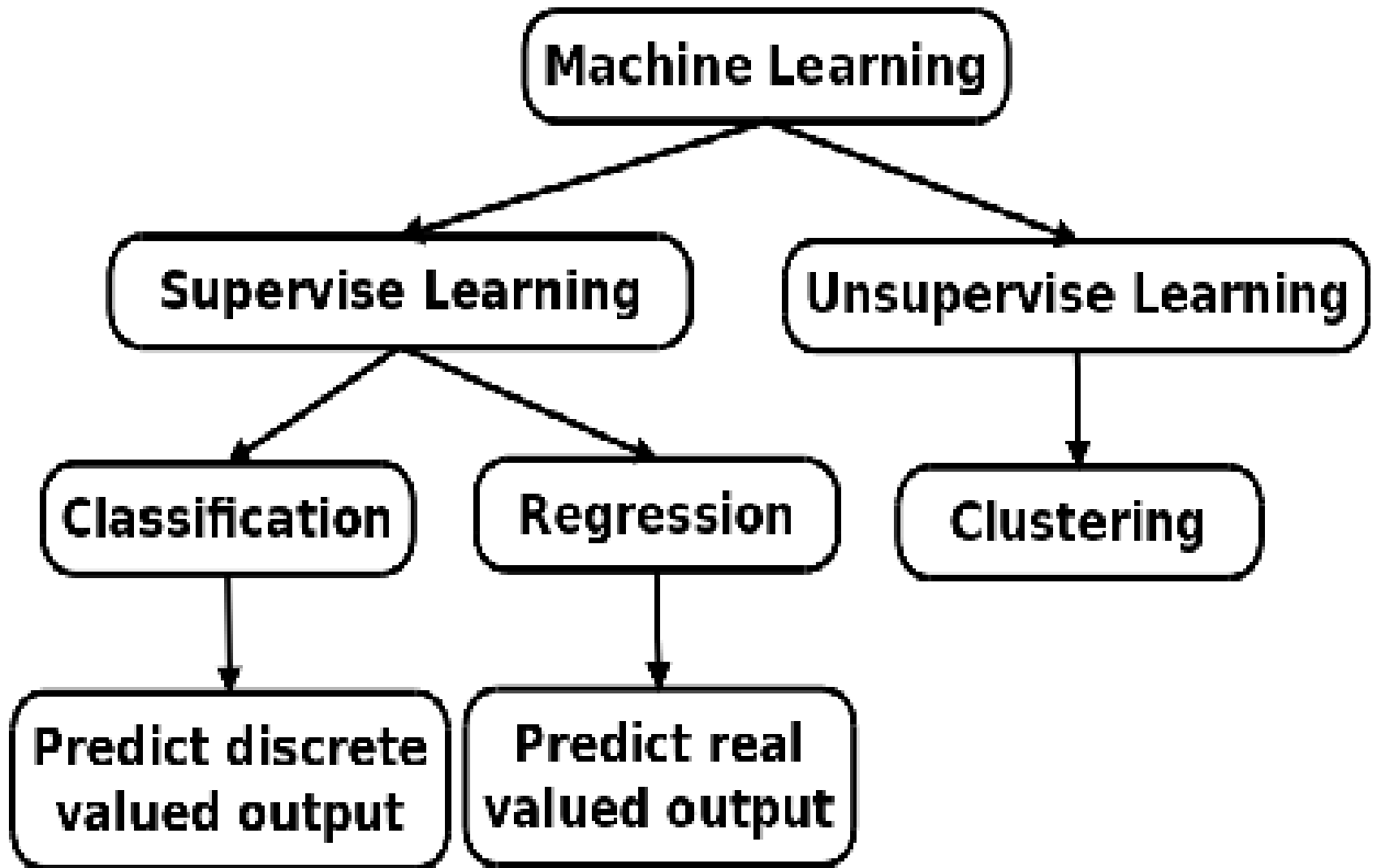
1. Classification of e-mail into **SPAM or NON-SPAM**
 2. Classification of transaction as **FRAUD or GENUINE**
 3. Patients diagnosed as **DIABETIC or NON-DIABETIC**
 4. Gene Classification into **CODING or NON-CODING**.
- Many more.

What is Machine Learning ?

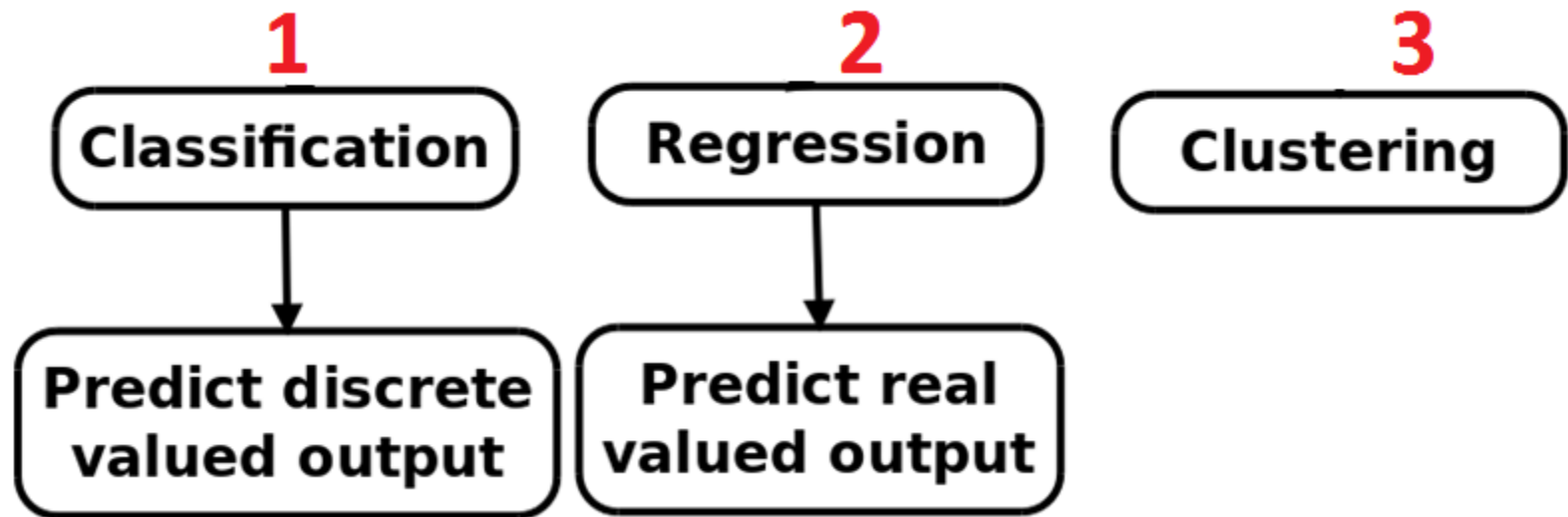
What is Machine Learning ?

- **Simple Definition I** - Branch of Artificial Intelligence that gives computers to learn without being explicitly programmed.
- **Simple Definition II** - Branch of Artificial Intelligence, about to construct a system that learn from data.
- **Actual Definition** - A computer program is said to *learn* from experience E with respect to some task T and some performance measure P , if its performance on T , as measured by P , improves with experience E .

Categories of Machine Learning



You have to only deals with



Examples

- **Regression Problem**
 - Prediction of wheat production.
 - Prediction of rainfall.
 - Point prediction of Stock Exchange.
- **Classification Problems**
 - Prediction of cancer.
 - Win prediction of Sheila Dixit.
 - Diabetic Prediction.
 - Classification of e-mail.

Examples

- **Clustering**
 - Grouping of NEWS.
 - Grouping the people on their similar hobbies/interests.
 - Grouping of animals.
 - Grouping of customers based on their performance.
E.g. bank customers.
 - Many more.

Data Set format for Machine Learning

Explore

- Sample Dataset

Understand the Data.....

Features / Properties

Class / Target

	A	B	C	D	E	F	G	H	I	J	K
1	Code	Clump_Th	Cell_Size	Cell_Shap	Marginal	Single Epi	Bare Nucl	Bland Chr	Normal N	Mitoses	Class
2	1000025	5	1	1	1	2	1	3	1	1	2
3	1002945	5	4	4	5	7	10	3	2	1	2
4	1015425	3	1	1	1	2	2	3	1	1	2
5	1016277	6	8	8	1	3	4	3	7	1	2
6	1017023	4	1	1	3	2	1	3	1	1	2
7	1017122	8	10	10	8	7	10	9	7	1	4
8	1018099	1	1	1	1	2	10	3	1	1	2
9	1018561	2	1	2	1	2	1	3	1	1	2
10	1033078	2	1	1	1	2	1	1	1	5	2
11	1033078	4	2	1	1	2	1	2	1	1	2
12	1035283	1	1	1	1	1	1	3	1	1	2
13	1036172	2	1	1	1	2	1	2	1	1	2
14	1041801	5	3	3	3	2	3	4	4	1	4
15	1043999	1	1	1	1	2	3	3	1	1	2
16	1044572	8	7	5	10	7	9	5	5	4	4

Classification & Regression

Classification : Predict discrete valued output.

Regression : Predict real valued output.

Class	F1	F2	F3	F4	F5
5	5769.3	1634.9	0.3	57.0	76946
3	12962.3	3389.2	0.3	141.3	17618
13	5960.2	2230.7	0.4	64.3	84555
11	9926.8	3276.7	0.3	102.0	13869
15	6658.5	2590.6	0.4	62.2	95121
3	12272.7	2836.1	0.2	140.0	16656
2	12579.2	3473.6	0.3	129.4	17371
19	11969.7	4721.9	0.4	110.1	15700
19	21779.3	8269.9	0.4	250.2	29574
20	9020.8	2509.4	0.3	97.9	12392


1 Classification Data

Class	F1	F2	F3	F4
4.5	5769.3	1634.9	0.3	57.0
3.0	12962.3	3389.2	0.3	141.3
12.7	5960.2	2230.7	0.4	64.3
11.5	9926.8	3276.7	0.3	102.0
14.9	6658.5	2590.6	0.4	62.2
2.5	12272.7	2836.1	0.2	140.0
2.2	12579.2	3473.6	0.3	129.4
18.8	11969.7	4721.9	0.4	110.1
19.4	21779.3	8269.9	0.4	250.2
19.6	9020.8	2509.4	0.3	97.9

2 Regression Data

Clustering Data

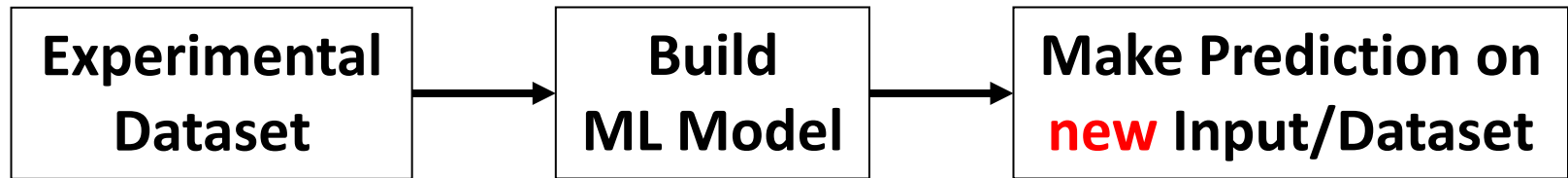
Features / Properties



	A	B	C	D	E	F	G	H	I	J
1	Code	Clump_Th	Cell_Size	Cell_Shap	Marginal /	Single Epi	Bare Nucl	Bland Chr	Normal N	Mitoses
2	1000025	5	1	1	1	2	1	3	1	1
3	1002945	5	4	4	5	7	10	3	2	1
4	1015425	3	1	1	1	2	2	3	1	1
5	1016277	6	8	8	1	3	4	3	7	1
6	1017023	4	1	1	3	2	1	3	1	1
7	1017122	8	10	10	8	7	10	9	7	1
8	1018099	1	1	1	1	2	10	3	1	1
9	1018561	2	1	2	1	2	1	3	1	1
10	1033078	2	1	1	1	2	1	1	1	5
11	1033078	4	2	1	1	2	1	2	1	1
12	1035283	1	1	1	1	1	1	3	1	1
13	1036172	2	1	1	1	2	1	2	1	1
14	1041801	5	3	3	3	2	3	4	4	1
15	1043999	1	1	1	1	2	3	3	1	1
16	1044572	8	7	5	10	7	9	5	5	4

Only Features; No class/target/label

Basic Idea for ML



Example1: Applying Liner Model

1. Experimental Dataset

X1	X2	X3	X4	Output
5	1	1	3	25
1	5	5	1	20
2	3	1	3	27
4	2	5	4	29
1	4	5	5	30
4	5	3	2	21
5	5	1	1	30
3	2	1	4	29

Example1: Applying Liner Model

2. Build ML Model

Linear Model

$$Y = w_1 x_1 + w_2 x_2 + w_3 x_3 + w_4 x_4$$

$$\text{Output} = 9x_1 + 6x_2 - 10x_3 + 5x_4$$

Example1: Applying Liner Model

3. Make Prediction on **new** Input/Dataset

new Input →

X1	X2	X3	X4	Output
3	4	2	2	?

Apply Linear Model

$$\begin{aligned}\text{Output} &= 9x_1 + 6x_2 - 10x_3 + 5x_4 \\ &= 9*3 + 6*4 - 10*2 + 5*2 \\ &= 41\end{aligned}$$

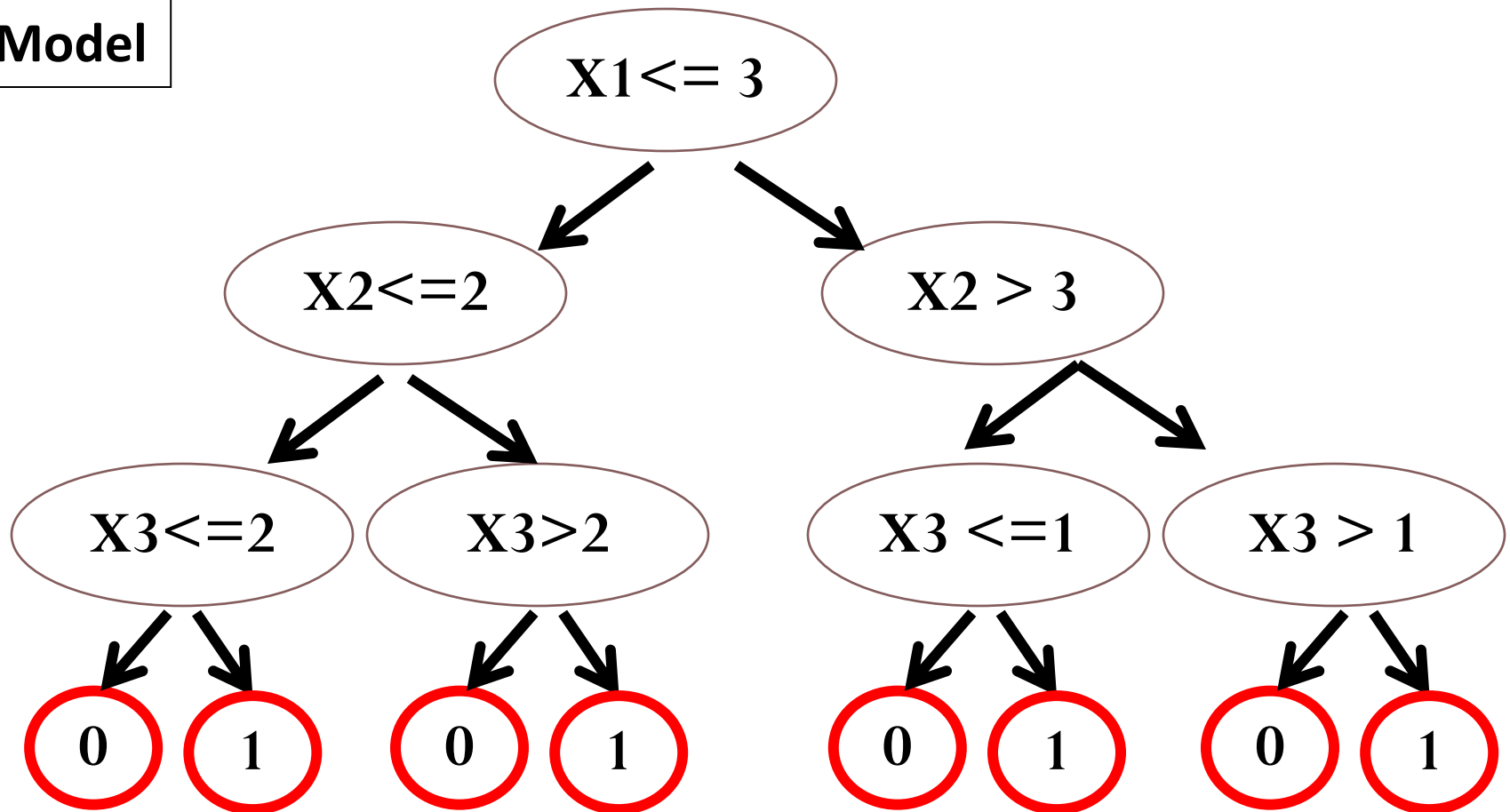
Example2: Applying Decision Tree

1. Experimental Dataset

X1	X2	X3	Output
5	1	1	0
1	5	5	0
2	3	1	1
4	2	5	0
1	4	5	1
4	5	3	1
5	5	1	0
3	2	1	1

Example2: Applying Decision Tree

2. Build ML Model



Example2: Applying Decision Tree

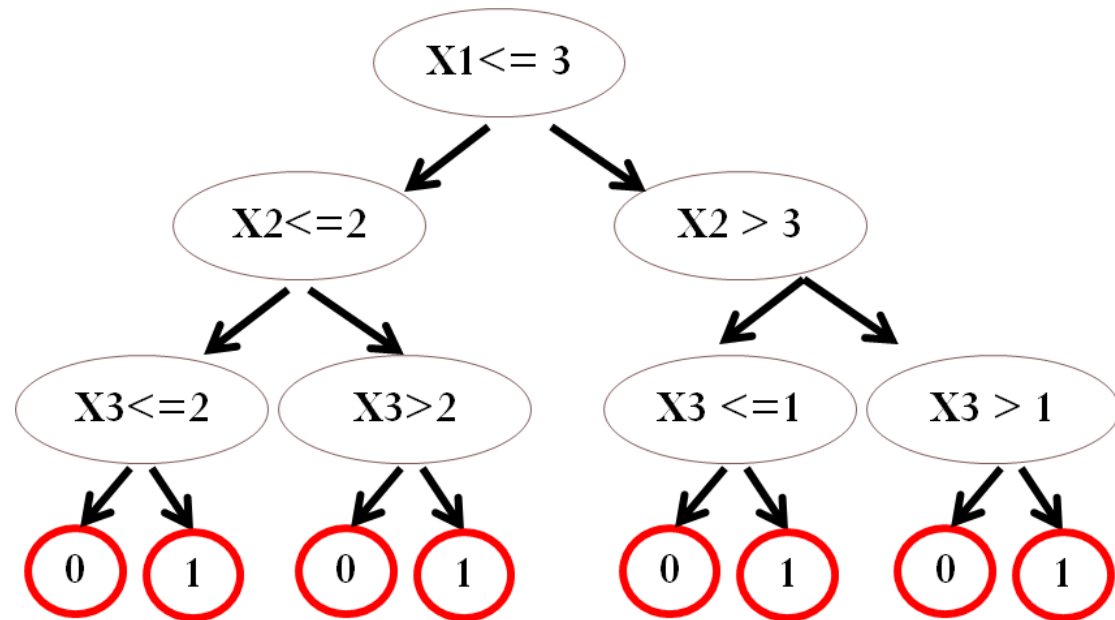
3. Make Prediction on **new** Input/Dataset

new Input →

X1	X2	X3	Output
3	4	2	?

Apply Decision Tree

Output = 0



Machine Learning models

Most Common models

- Decision tree model
- Random forest
- SVM (Support Vector Machine)
- Linear Model
- Neural Network

Machine Learning models

S.No	Model Name	Model Type	Method	Package	Tuning Parameter(s)
1	ada	Classification	ada	ada	maxdepth, iter, nu
2	avNNet	Dual Use	avNNet	caret	decay, size, bag
3	bag	Dual Use	bag	caret	vars
4	bdk	Dual Use	bdk	kohonen	xweight,topo,xdim,ydim
5	blackboost	Dual Use	blackboost	mboost	maxdepth, mstop
6	Boruta	Dual Use	Boruta	Boruta	mtry
7	bstTree	Dual Use	bstTree	bst	maxdepth, nu, mstop
8	C5.0	Classification	C5.0	C50	winnow, trials, model
9	cforest	Dual Use	cforest	party	mtry
10	ctree	Dual Use	ctree	party	mincriterion
11	cubist	Regression	cubist	Cubist	committees, neighbors
12	enet	Regression	enet	elasticnet	lambda, fraction
13	foba	Regression	foba	foba	lambda, k
14	GAMens	Classification	GAMens	GAMens	fusion, iter, rsm_size
15	gamLoess	Dual Use	gamLoess	gam	degree,span
16	gbm	Dual Use	gbm	gbm	trees, shrinkage,depth
17	gcvEarth	Dual Use	gcvEarth	earth	degree
18	glm	Dual Use	glm	stats	None
19	icr	Regression	icr	caret	n.comp
20	J48	Classification	J48	RWeka	C

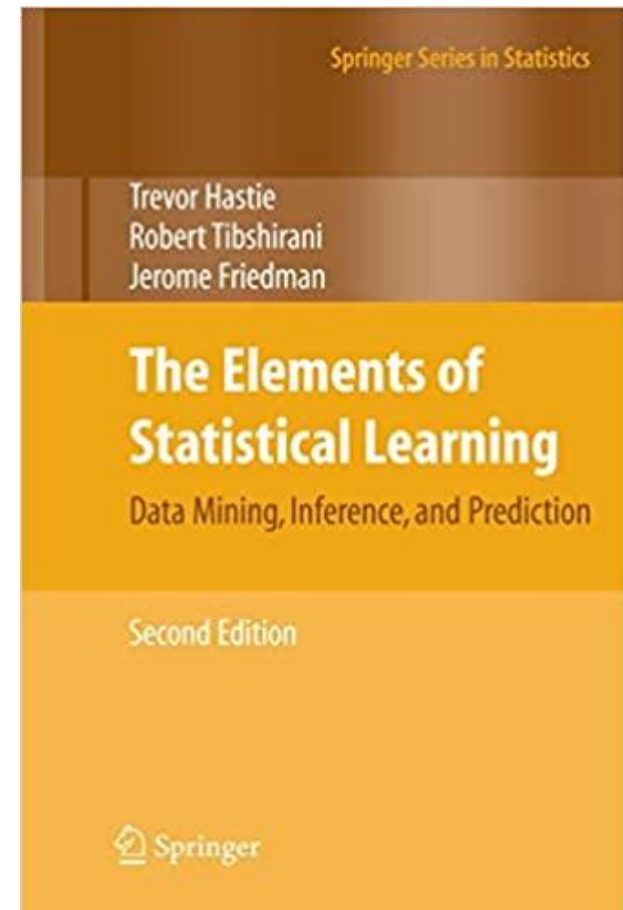
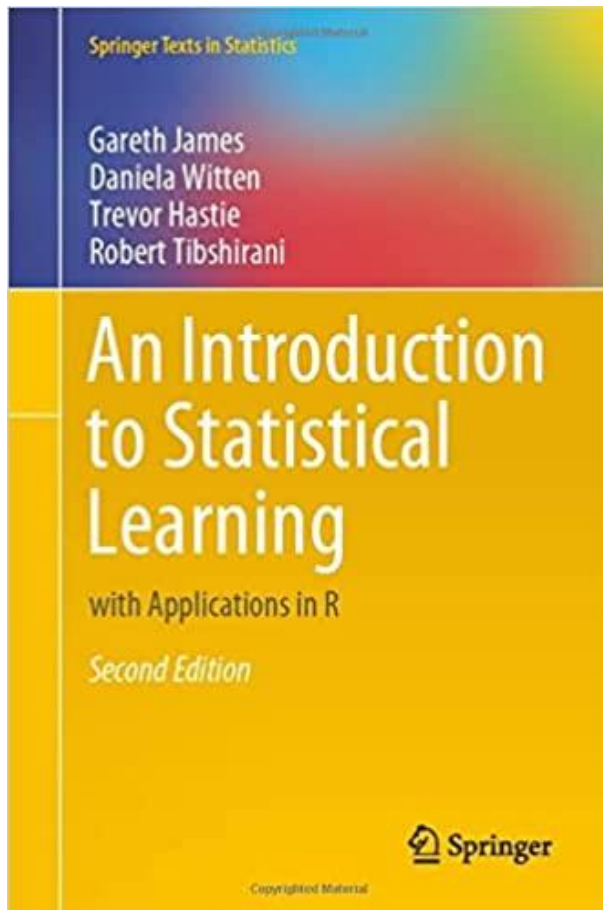
Machine Learning models

Already 500+ ML models are available for prediction

- Go for New Model Building
- Applied Modelling (Use existing models and solve real-world problem)

Books

Best Book for ML

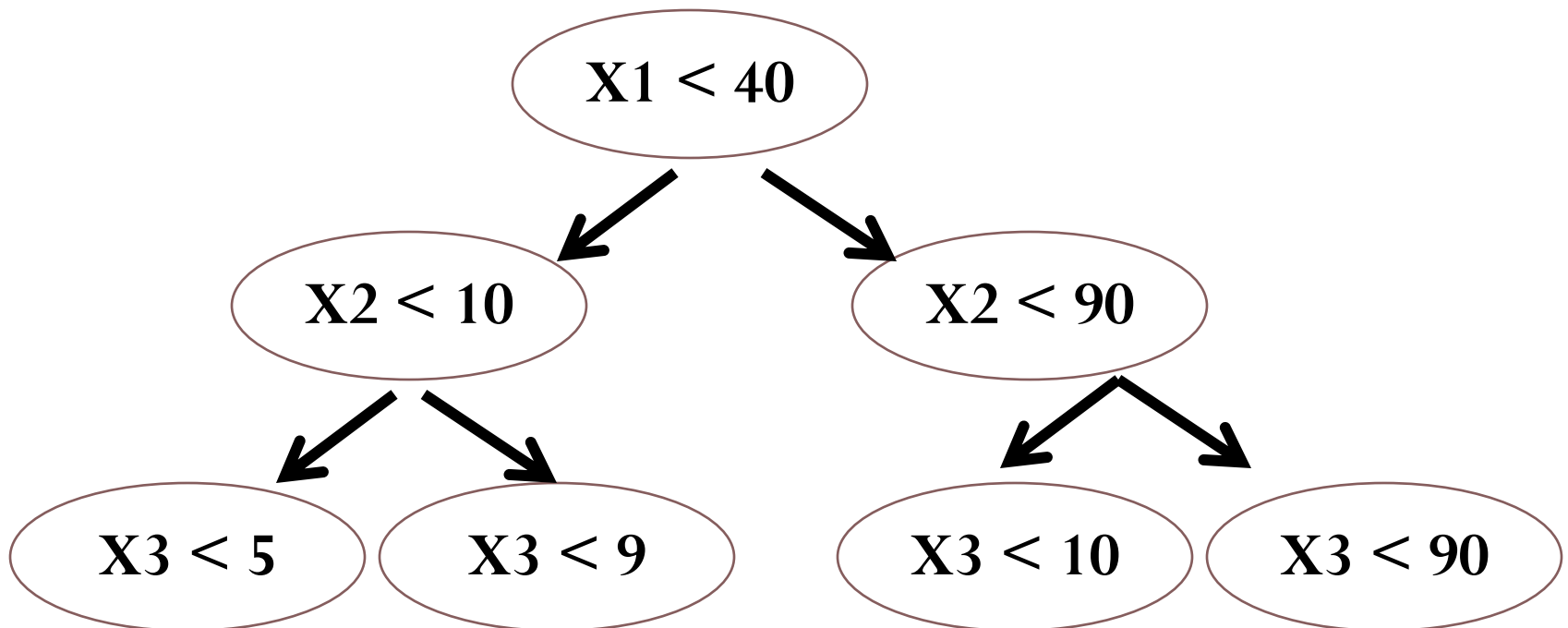


Types of Models

- **Linear Model**

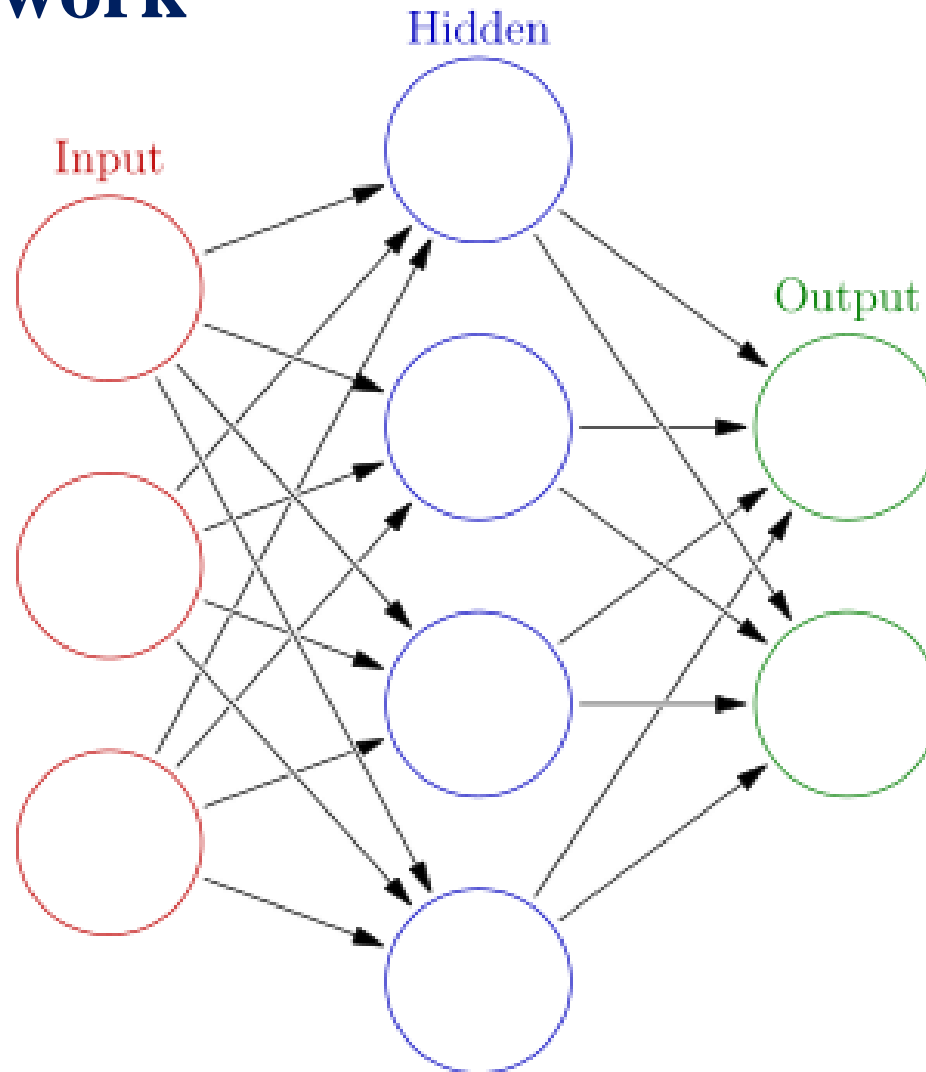
$$Y = w_1 x_1 + w_2 x_2 + w_3 x_3 + w_4 x_4 + w_5 x_5$$

- **Tree Based model**



Types of Models.....

- **Neural Network**



Resources?

1. www.psrana.com → Resource

2. leadingindia.ai → Resources

Image Colorization

More Examples.....



More Examples.....

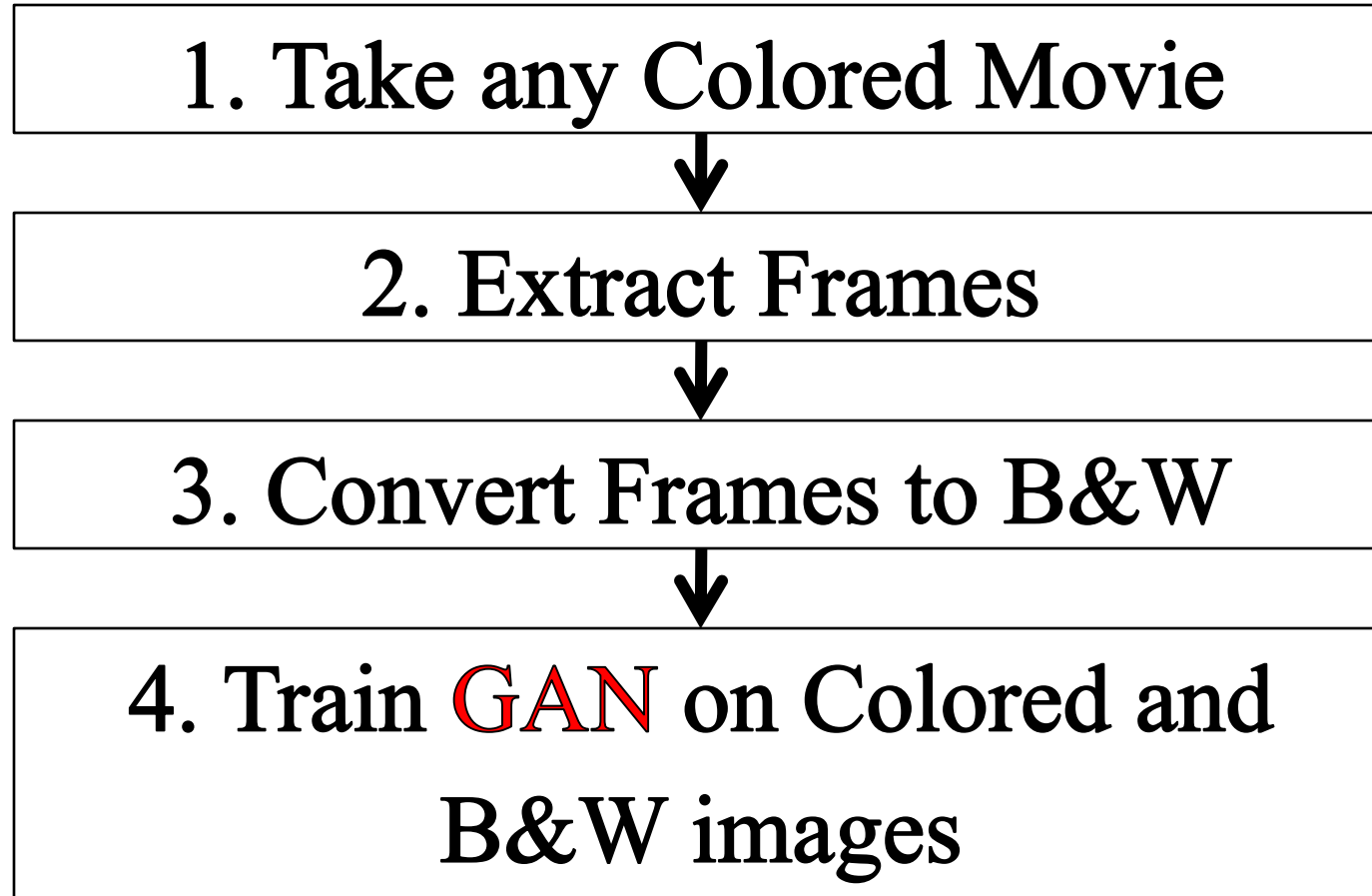


**Can you think any APPLICATION
that can be developed using
Image Colorization??**

**Convert Black & White movies
to Colored.**

Methodology/Approach ??

Approach



GAN → Generative Adversarial Networks
(invented by **Ian Goodfellow** in 2014 in **Beer Bar**)

Approach.....

5. Take any new B&W Movie



6. Extract Frames



7. Apply **GAN** on B&W Frames



8. Merge all the frames into a
single movie

Outcome



Product (Web Service)

Example: Online Doc to PDF Converter

Web Interface

File Name

Browse File....

Email Id

psrana@gmail.com

Submit

Product (Web Service)

B&W to Colour

Web Interface

File Name

Browse B&W movie file....

Email Id

psrana@gmail.com

Submit

How to create Web Applications??

- Django
- Flask

Hottest Topics ???

Hottest Topics Research / Projects

1. Deep Learning
2. Machine Learning
3. Transfer Learning
4. Reinforcement Learning
5. IoT
6. Big Data Analytics
7. Virtual Reality
8. Block Chain
9. NLP (Natural Language Processing)
10. Image Processing or Computer Vision
- 11.....many many more

How to get the ideas for Project/Research

(A Million Dollar Question)

For Project Idea: Explore

It is not a job of single day.

For Project Idea: Explore

It is not a job of single day.

1. Explore

- Hackathons, Funding agency site, Project calls, etc

2. Study

- Case study, Funding stories (YourStory.com)

3. Discuss

- With Friend, Faculty, Teacher, Mentor, Students

4. Build Team and Implement

5. Present

For Project Idea: Note it down

For any **new idea** just
prepare 1-2 page writeup

1. Title
2. Methodology
3. Expected Outcome
4. Requirement (equipment)

For Project Idea

1. Leading India AI

www.LeadingIndia.ai

For Project Idea

1. Leading India AI

LEADINGINDIA.AE
NATIONWIDE AI SKILLING & RESEARCH INITIATIVE

- www.LeadngIndia.ai (AI/ML based problems)
- Lead by Prof. Deepak Garg
- Ready made AI/ML based problem statement.

Explore: **Projects, Resources, Research Projects**

LEADINGINDIA.AE
NATIONWIDE AI SKILLING & RESEARCH INITIATIVE

HOME WORKSHOPS PUBLICATION ASSOCIATES RESOURCES PROJECTS RESEARCH PROJECTS TEAM INTERNSHIP CONTACT US LOGIN

NEWS

BLOGS

GALLERY

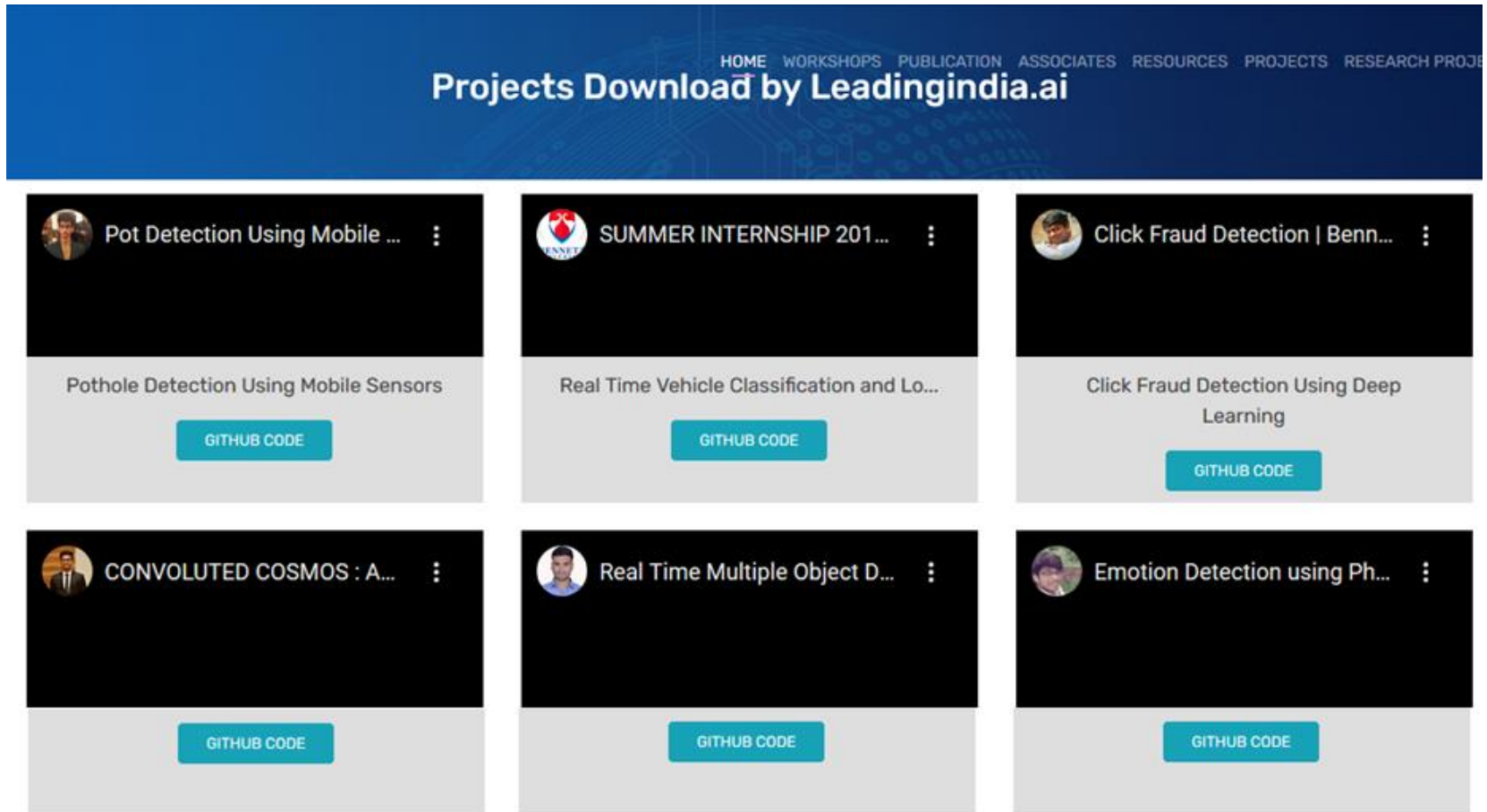
Technologies. For registrations and details: Click here

Leadingindia.ai Conducting Five Workshop on Latest Technologies. For registrations and details: Click here







Leadingindia.ai Conducting f

Project Idea: LeadingIndia.ai

Go to → leadingindia.ai → Projects



The screenshot displays the 'Projects' section of the LeadingIndia.ai website. At the top, a dark blue header contains the navigation menu: HOME, WORKSHOPS, PUBLICATION, ASSOCIATES, RESOURCES, PROJECTS, and RESEARCH PROJECTS. Below the header, the title 'Projects Download by Leadingindia.ai' is centered. The main content area features a grid of six project cards, each with a profile picture, a title, a description, and a 'GITHUB CODE' button.

Profile	Project Title	Description	Action
	Pot Detection Using Mobile ...	Pothole Detection Using Mobile Sensors	GITHUB CODE
	SUMMER INTERNSHIP 201...	Real Time Vehicle Classification and Lo...	GITHUB CODE
	Click Fraud Detection Benn...	Click Fraud Detection Using Deep Learning	GITHUB CODE
	CONVOLUTED COSMOS : A...		GITHUB CODE
	Real Time Multiple Object D...		GITHUB CODE
	Emotion Detection using Ph...		GITHUB CODE

Project Idea: LeadingIndia.ai

Go to → leadingindia.ai → Research Projects



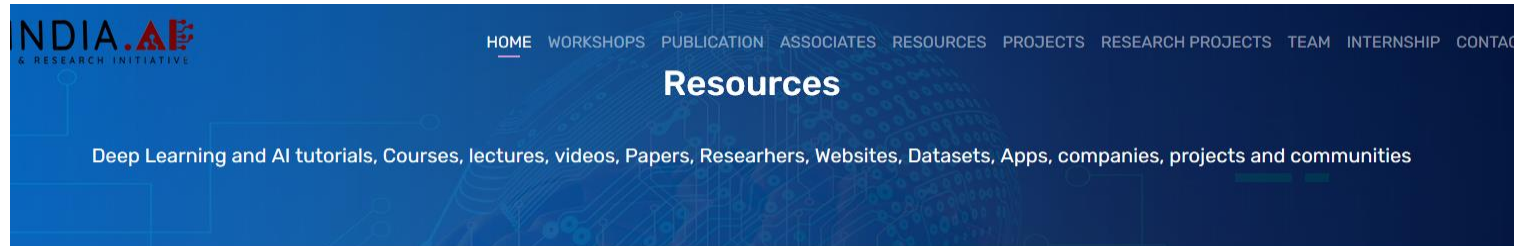
Tentative Titles of the projects are given below

Healthcare

1. Drug discovery using Neural Networks
2. Tumor detection from Brain MRI images
3. Detection and Classification of cancer cells in MRI Images
4. Organ Segmentation and Labelling in MRI Images
5. Cancer cell detection and segmentation
6. Blood flow detection and monitoring using Sensory data
7. Diabetic Retinopathy Detection and Segmentation from MRI Images
8. Personalized Treatment based on Patient History
9. AI System for Prediction and Recommendation of Diabetes
10. Recommendation of doctors and medicines using review mining
11. Disease Prediction using patient treatment history and health data
12. Real-time health monitoring using wearable devices
13. Prediction of epidemic outbreaks using Social Media Data

Project Idea: LeadingIndia.ai

Go to → leadingindia.ai → Resources



Deep Learning Online Certifications	⊕
Machine Learning and Data Science Online Courses	⊕
Machine Learning and Deep Learning Courses	⊕
Free Online Books	⊕
Videos and Lectures	⊕
Github Tutorial Repositories	⊕
Github Code Repositories	⊕
Tutorials	⊕

For Project Idea: SIH

2. Smart India Hackathon (SIH)

www.sih.gov.in

For Project Idea: SIH

Winner in Smart India Hackathon (SIH) from Thapar

- **2017 → 01 Team (3rd position)**
- **2018 → 01 Team (2nd position)**
- **2019 → 05 Teams (1st Position (04) and 2nd (01))**
- **2020 → 02 Teams (1st Position (02))**

For Project Idea: SIH

2. Smart India Hackathon (SIH)

- www.sih.gov.in (Best resource for project idea)
- Explore problem statements of current and previous years.
353 problems in 2020 from different agencies and ministries.



3. Innocentive

www.innocentive.com

For Project Idea

3. Innocentive

- www.innocentive.com (Real life problems)
- Go to Challenge Center → Challenges
- Ready made Problem statement, Literature, Expected outcome and **price money**.

The screenshot displays the Innocentive website interface. At the top, there is a dark blue header with the 'innocentive' logo (a wazoku brand), a search bar, and links for 'Login or Register'. Below the header is a navigation bar with links: Home, Dashboard, Challenges, Our Solvers, Our Offering, Resources, Help, and Activate Existing Account. A secondary navigation bar contains 'Challenges' and 'Pavilions' tabs, followed by filters for Discipline, Challenge Types, Pavilions, and Status. The main content area shows a list of challenges, with 31 results displayed, sorted by 'Posted Date Newest'. The first five challenges are visible:

Challenge Title	Organization	Open Until	Award	Active Solvers
MISO Challenge: Situational Awareness and Data Visualization in MISO's O...	MISO	14 Sep 2020	\$15,000	8
ICL Challenge: New Applications for Powdered Polysulphate™	ICL	17 Aug 2020	\$10,000	189
New Smart City Solutions Enabled by Open Data	Reduction to Practice (RTP)	10 Sep 2020	\$30,000	-
ReShape: A Global Call for the Energy Transition	Electronic Request for Partners (eR...)	30 Sep 2020	Collaboration with Enel	-
The SUDEP Institute Challenge: Developing Predictive Biomarkers of SUDEP	SUDEP INSTITUTE	10 Oct 2020	\$1,000,000	694

Each challenge card includes a 'VIEW CHALLENGE' link at the bottom.


4. Kaggle

www.kaggle.com


For Project Idea

4. Kaggle

- www.kaggle.com (Data Science problems) → Compete
- Ready made Problem statement, Literature, Expected outcome and **price money**.

**New to Kaggle? Start here!**

Our Titanic Competition is a great first challenge to get started.

**Titanic: Machine Learning from Disaster**




Start here! Predict survival on the Titanic and get familiar with ML basics
Getting Started • Ongoing • 19556 Teams

Knowledge

All Competitions

ActiveCompletedInClass

All Categories ▼Default Sort ▼

	OSIC Pulmonary Fibrosis Progression Predict lung function decline Featured • a month to go • Code Competition • 1304 Teams	\$55,000
	Lyft Motion Prediction for Autonomous Vehicles Build motion prediction models for self-driving vehicles Featured • 3 months to go • Code Competition • 192 Teams	\$30,000
	Cornell Birdcall Identification Build tools for bird population monitoring Research • 16 days to go • Code Competition • 1150 Teams	\$25,000

What is Structured, Semi-Structured and Unstructured Data??

Unstructured Data

- **No format is defined**
- **Example:**
 - **1000 movies in a folder**
 - **10k docs in a folder**
 - **500 images in a folder**
 - **..... many more**

Structured Data

- **Stored in well defined format**
- **Example: Song**

Song ID	Language	Genre	Singers	Likes	Dislikes	.	.
1	En	Rock	2	10k	1k	.	.
2	En	Jazz	2	11k	1.5k	.	.
3	Hi	Pop	3	20k	2k	.	.
4	Hi	Jazz	1	15k	1.2k	.	.
.
.

Semi-structured Data

- **Little format is defined**
- **Example:**
 - 1000 movies in three folder (12+, 16+, 18+)
 - 10k docs in 4 folder (A, B, C, D)
 - 500 photos in two folder (Male, Female)
 - 10k tweets in two files (-ve, +ve)
 - many more

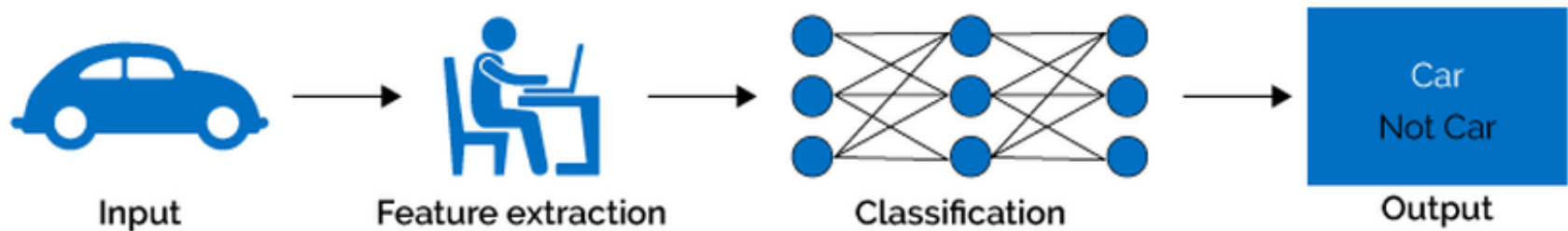
Data Set format for Machine Learning

- Multiple columns and one column is labelled (Strength)

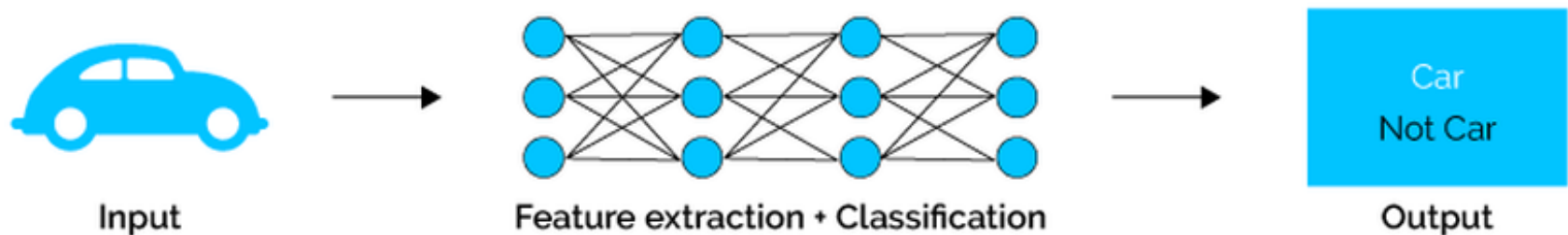
x1	x2	x3	x4	x5	Strength
17	0	-5	0.784245	37	26
12	0	-10	0.587296	25	27
18	0	-7	0.876622	40	25
11	0	-7	0.80826	24	23
18	0	-4	0.83215	37	28
10	1	-9	0.62842	27	28
19	0	7	0.522811	44	30
19	-1	4	0.548609	37	23
15	0	-6	0.177904	46	20

Difference between Machine Learning & Deep Learning ??

Machine Learning



Deep Learning



Additional Resources

● Explore → psrana.com → Resources

UNIT VI: Gold Mine for Researchers (Free Books, Papers, Thesis)

1. For Research Papers

- [Sci Hub](#)

Search using **DOI** (Digital Object Identifier).

Example (Search for): **10.1016/j.bbapap.2014.07.010**

- [BookSC](#)

Search using title

Example (Search for): **"Quality assessment of modeled protein structure using physicochemical properties"**

2. For Books

- [Library Genesis](#)

- [ZLibrary](#)

3. For Thesis | [ProQuest](#)

4. Paper with Code | [Click Here](#) | **Most Important**

5. Two Minutes Papers | [Click Here](#)

6. Explore

- Google Dataset Search | [Click Here](#)

- Explore Kaggle (Compete, Datasets, Notebooks, Jobs, more) | [Click Here](#)

- UCI dataset for Regression, Classification, Clustering, etc | [Click Here](#)

Where to get papers?

Where to get papers?

Sci Hub

www.sci-hub.tw

*** Domain name changes time to time.**

Where to get Books?

Where to get Books?

Library Genesis

<http://gen.lib.rus.ec>

*** Domain name changes time to time.**

Papers with Code

www.paperswithcode.com

- Find recent paper in Machine Learning / Deep learning / Computer Vision / Natural Language Processing / etc
- Github code is available with every paper.

Explore Hackathons

Explore Hackathons

Helps in selecting research topics.

www.kaggle.com

www.chalearn.org

www.mlwave.com

www.tunedit.org

www.codalab.org

www.gesture.chalearn.org

www.innocentive.com

www.dreamchallenges.org

www.crowdanalytix.com

www.datahack.analyticsvidhya.com

www.numer.ai

www.genomeinterpretation.org

<http://grandchallenges.org/>

Join Mailing Groups?

Join Mailing Groups?

**Helps in selecting research topics,
recent news and updates**

<http://bit.ly/MachineLearningBlogAndResource>

<http://feedburner.google.com/fb/a/mailverify?uri=analyticsvidhya>

<http://www.innocentive.com/blog>

<https://www.crowdanalytix.com/blog>

<http://www.kdnuggets.com/news/subscribe.html>

<http://www.r-bloggers.com/blogs-list/>

Learn Fast

Learn Fast

- 1. To learn FAST Learn from slides.**
- 2. Learn from Youtube / Videos.**

Code Sharing

Code Sharing

1. Share your code on GitHub

<https://github.com>

Present your work

Present your work

- 1. Given Weekly / Monthly Presentation to you friends, boss, students, kids or to your wife.**
- 2. Record it and improve it.**

Tools and Techniques

- **Python libraries**
 - **Numpy & Scipy** - Fundamental Scientific Computing
 - **Pandas** - Data Manipulation and Analysis
 - **Matplotlib** - Plotting and Visualization
 - **Scikit-learn** - Machine Learning and Data Mining
 - **StatsModels** - Statistical Modelling, Testing, and Analysis
 - **Seaborn** - For Statistical Data Visualization
 - **Plotly** - For sophisticated graphics
 - **Pydot** - For complex oriented and non-oriented graphs

* Install and explore the above libraries.

Tools and Techniques

- **Tool: Anaconda**
 - IDLE for Python



- **Google Colab**
 - Online Jupyter notebook for Python
 - Widely used platform for ML & DL

Data Set

- **Google Dataset Search**
 - datasetsearch.research.google.com
- **Kaggle**
 - www.kaggle.com
 - Explore (Compete, Datasets, Notebooks, Jobs, more)
- **UCI dataset**
 - Google it “UCI Dataset”
 - Dataset available for Regression, Classification, Clustering

Finally



Learning by Doing

Thanks

Q & A

Learning by Doing

Contact

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