

DST - SERB - FDP

18th January 2022

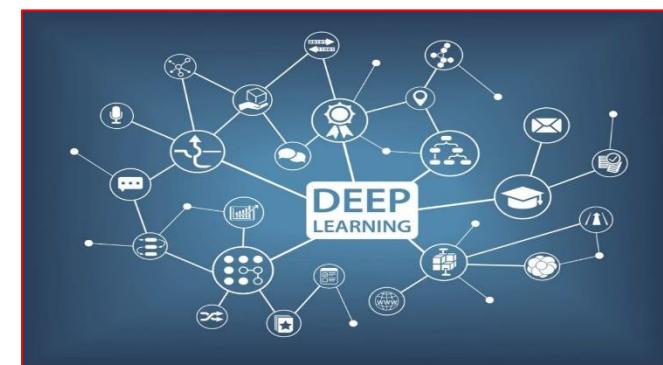
DEEP LEARNING FOR HEALTHCARE APPLICATIONS

By

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Research Coordinator of Data Science Research Lab



BLUECREST UNIVERSITY

(AUTONOMOUS & AFFILIATED TO NCHE, MONROVIA, LIBERIA)

2021-2022



1 MILLION
logging in



3.8 MILLION
search queries



694,444
hours watched



2.1 MILLION
snaps created



4.5 MILLION
videos viewed



390,030
apps downloaded



347,222
scrolling



87,500
people tweeting



\$996,956
spent online

exoClick

4.86 MILLION
impressions served

2 MILLION
RTB queries

exoClick

\$1.05
\$0.75

1.8 MILLION
emails sent



41
music streaming
subscriptions



1.4 MILLION
swipes

CHECK THE STATISTICS IN THE WORLD WIDE



4,499,047,483

Internet Users in the world



1,755,539,787

Total number of Websites



128,231,872,481

Emails sent [today](#)



3,466,609,205

Google searches [today](#)



3,314,102

Blog posts written [today](#)



379,035,937

Tweets sent [today](#)

[**https://www.internetlivestats.com/**](https://www.internetlivestats.com/)



11
Accounts Created
5700
Tweets

YouTube

2314
Video Hours
Watched

2
Video Hours
Uploaded



5787
+1s



23
Blog Posts

Google

4608
Searches
\$1602
Ad Revenue

amazon

51
Items Purchased
\$2359
Money Spent

foursquare

35
Check-Ins

yelp

0.5
Reviews



634
App Downloads



1236
App Downloads

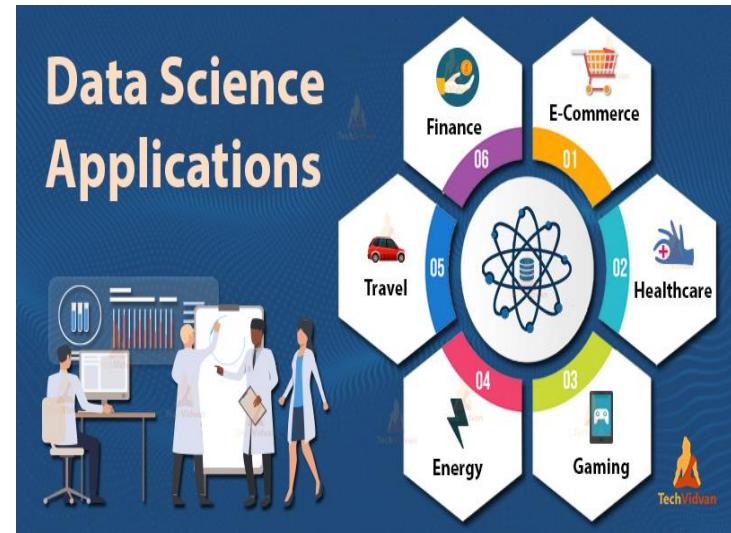


52196 Likes
54976 Posts
6 GB of Data



Contents

1. Introduction to Data Science
2. Python Programming
3. Statistics
4. Artificial Intelligence
5. Data Mining
6. Artificial Neural Networks
7. Machine Learning
8. Deep Learning
 - ✓ Covid-19 virus prediction & detection
 - ✓ Covid-19 strain virus prediction & detection
 - ✓ Ebola virus prediction & detection
 - ✓ Prostate cancer prediction & detection
 - ✓ Breast cancer prediction & detection
 - ✓ Lung cancer prediction & detection



Day 5: Introduction to Deep Learning

1. What is deep learning
2. Curse of Dimensionality
3. Machine Learning vs Deep Learning
4. Use Cases of Deep Learning
5. Perceptrons
6. Learning, Epoch, Batch Rate
7. Activation Function
8. Single Layer Perceptron

Day 6: Understanding Neural Networks

1. Limitation of Single Layer Perceptron
2. Importance of Multilayer Perceptrons
3. Pre-activation
4. Activation Function
5. Back Propagation and why is it used
6. Gradient descent
7. Tensorflow

Day 7: Convolutional Neural Networks(CNN)

1. Limitation of Multilayer Perceptron
2. Importance of CNN
3. Layers of CNN
4. Why ReLU layer is used
5. Image recognition Classifier

Day 8: Recurrent Neural Networks (RNN)

1. Feed Forward Network
2. Recurrent Neural Network(RNN)
3. Types of RNN
4. Application of RNN
5. Vectors
6. Letter/Word Prediction
7. Training an RNN

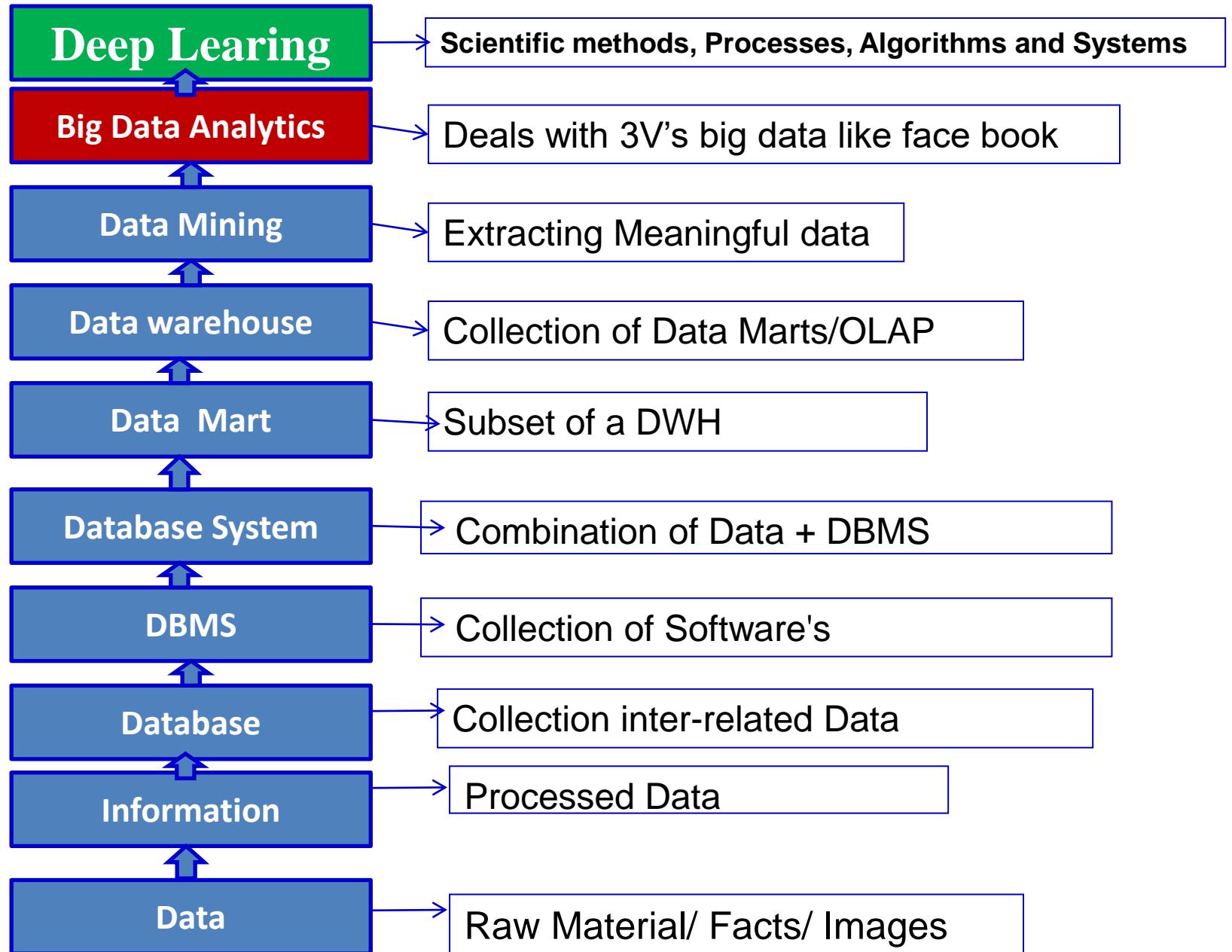


Fig: Pre-requisite of Deep Learning

BITS	MEASURE
1 Bit	0 or 1
4 Bits	1 Nibble
8 Bits	1 Byte
4 Bytes	1 Word
4 Words	1024 Bytes
1024 Bytes	1 KB
1024 KB	1 MB
1024 MB	1 GB
1024 GB	1 TB
1024 TB	1 PB
1024 PB	1 HB
1024 HB	1 OB
1024 OB	1 ZB
1024 ZB	1 YB
1024 YB	1 BB
1024 BB	1 Geo Byte
1024 Geo Bytes	Infinity

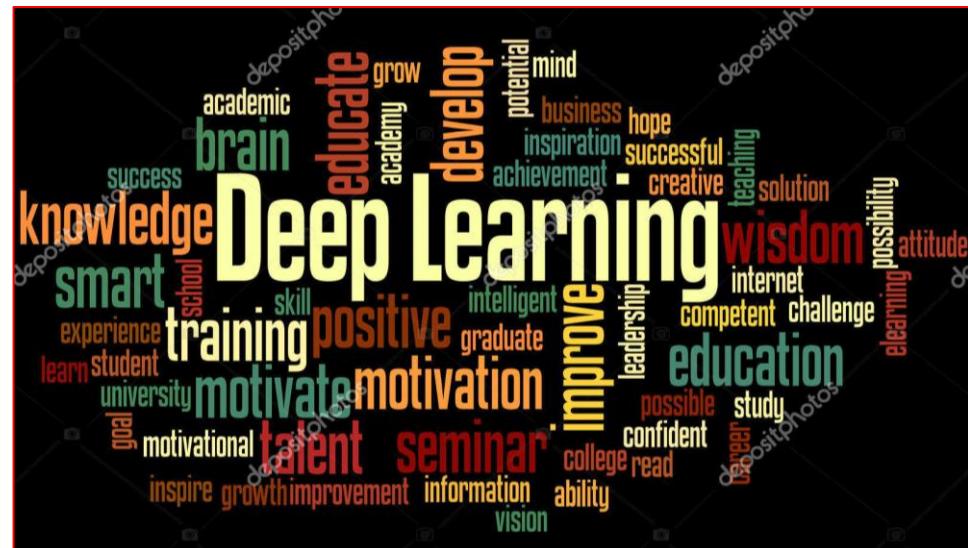


NORMAL RANGE		BIG DATA RANGE	
Kilo Byte (KB)	10^3	Peta Byte (PB)	10^{15}
Mega Byte (MB)	10^6	Exa Byte (EB)	10^{18}
Giga Byte (GB)	10^9	Zetta Byte (ZB)	10^{21}
Tera Byte (TB)	10^{12}	Yottabyte (YB)	10^{24}
		Brontobyte(BB)	10^{27}
		Geobyte (GeB)	10^{30}

Fig: Measuring the Data in Deep Learning

8. DEEP LEARNING

- ✓ Deep learning is part of a broader family of machine learning methods based on **artificial neural networks** with representation learning. Learning can be supervised, semi-supervised or **unsupervised**.
- ✓ Deep learning gets its name from the fact that it involves going **deep** into several layers of network, which also includes a hidden layer.



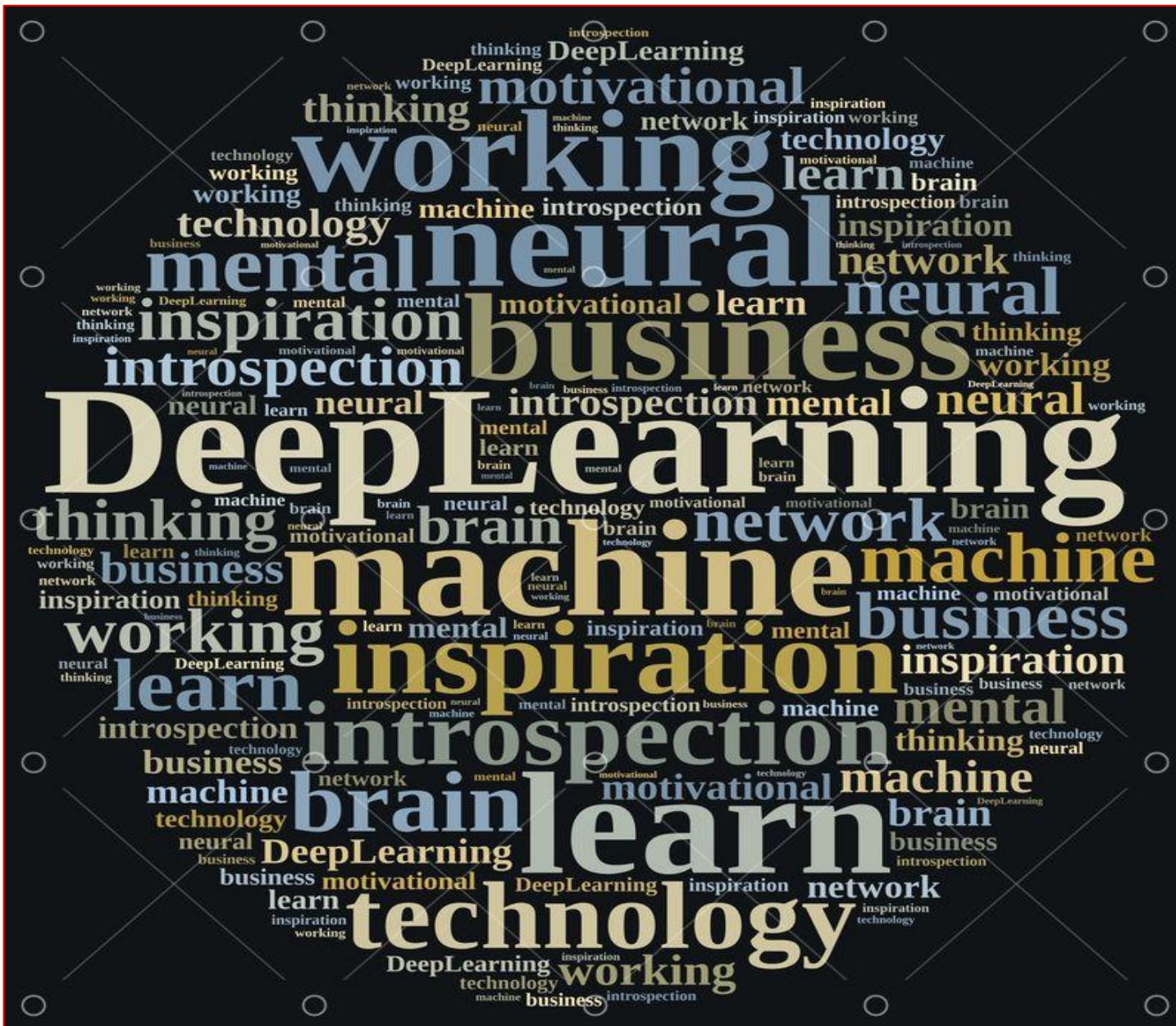


Fig: Deep Learning Word Cloud

Day 5: Introduction to Deep Learning

1. What is deep learning
2. Curse of Dimensionality
3. Machine Learning vs Deep Learning
4. Use Cases of Deep Learning
5. Perceptrons
6. Learning, Epoch, Batch Rate
7. Activation Function
8. Single Layer Perceptron

Understanding Neural Networks

1. Limitation of Single Layer Perceptron
2. Importance of Multilayer Perceptrons
3. Pre-activation
4. Activation Function
5. Back Propagation and why is it used
6. Gradient descent
7. Tensorflow

Day 6: Convolutional Neural Networks(CNN)

1. Limitation Of Multilayer Perceptron
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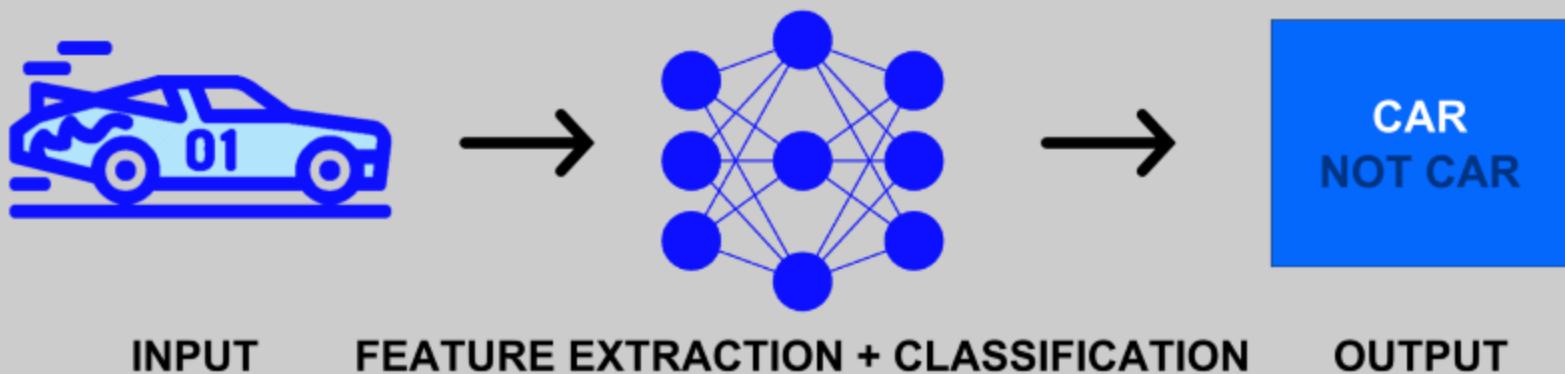
Recurrent Neural Networks (RNN)

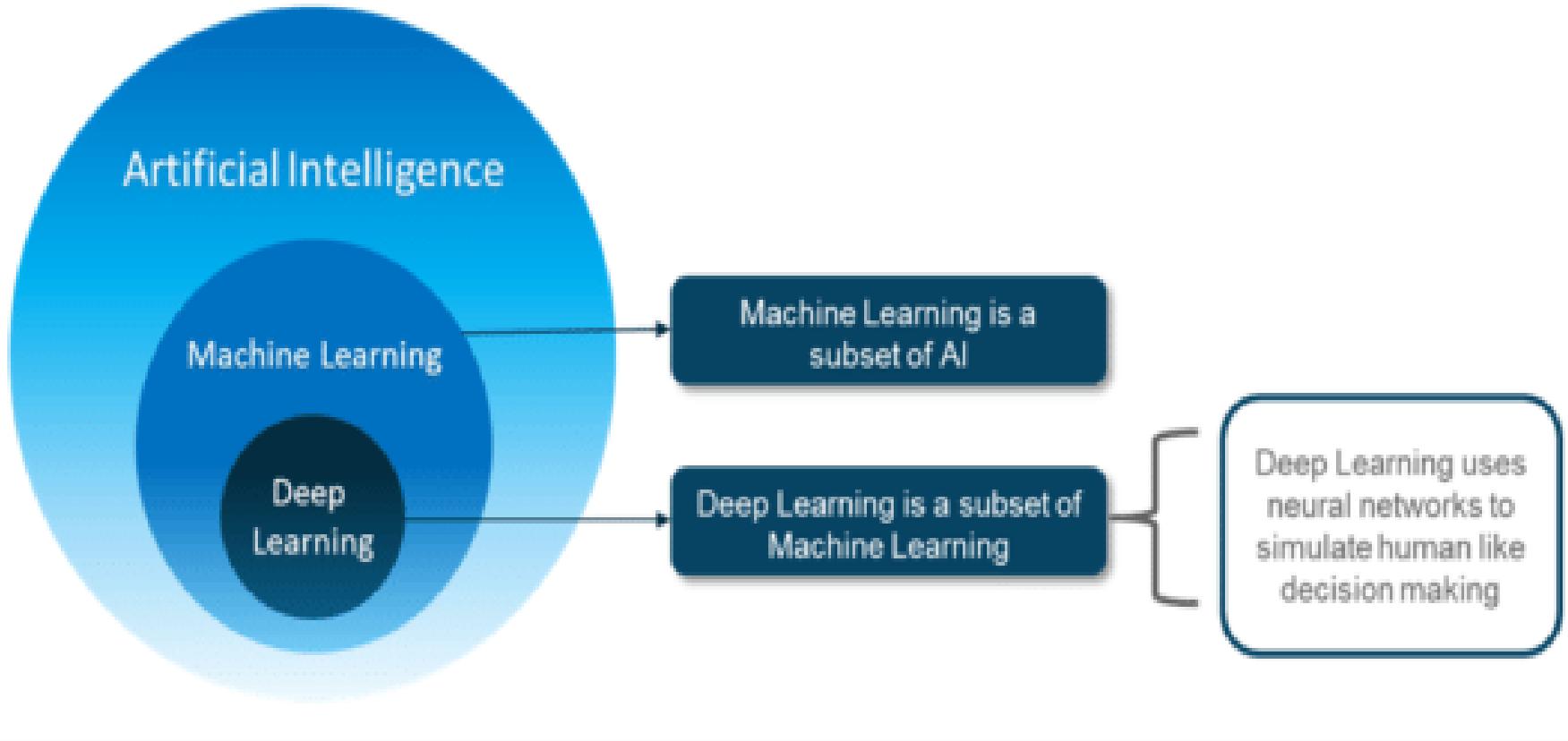
1. Feed Forward Network
2. Recurrent Neural Network(RNN)
3. Types of RNN
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5. Vectors
6. Letter/Word Prediction
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What is
Deep Learning?



WHAT IS DEEP LEARNING?



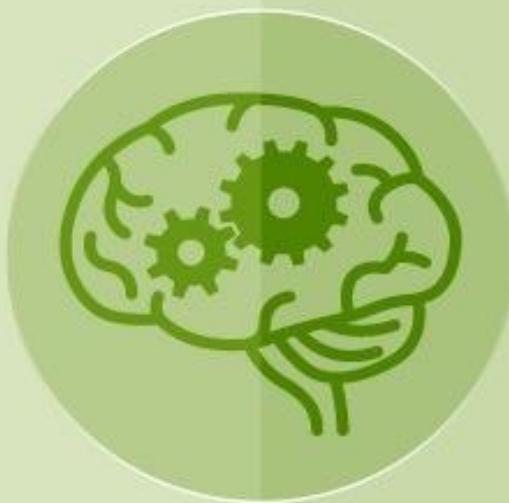


Artificial Intelligence



Engineering of
making Intelligent
Machines and Programs

Machine Learning



Ability to learn
without being explicitly
programmed

Deep Learning



Learning based on
Deep Neural
Network



- ✓ **Who invented deep learning?** In the mid-1960s, soviet mathematician, Alexey Ivakhnenko created small functional neural networks which is considered the first serious deep learning breakthrough.
- ✓ Deep learning is an AI function that mimics the workings of the human brain in processing data for use in detecting objects, recognizing speech, translating languages, and making decisions.
- ✓ The ability to process large numbers of features makes deep learning very powerful when dealing with unstructured data.

Artificial Intelligence

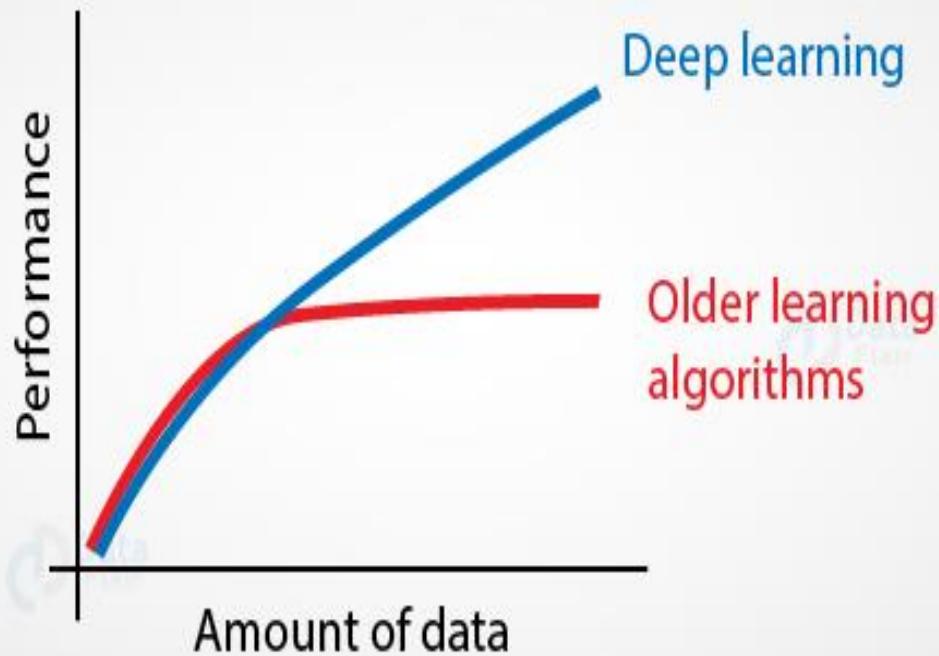
Enabling machines to think like humans

Machine Learning

Training machines to get better at a task without explicit programming

Deep Learning

Using multi-layered networks
for machine learning



How do data science techniques scale with amount of data?

Fig: Why Deep Learning

- ✓ Deep Learning Requires Larger Training Data Sets

✓ **Deep Learning:** Deep Learning is a subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called **artificial neural networks**. Deep learning is **a type of machine learning and artificial intelligence (AI)** that imitates the way humans gain certain types of knowledge. While traditional machine learning algorithms are linear, deep learning algorithms are stacked in a hierarchy of increasing complexity and abstraction.

✓ **Curse of Dimensionality:** The curse of dimensionality, first introduced by Bellman [1], indicates that **the number of samples needed to estimate an arbitrary function with a given level of accuracy grows exponentially with respect to the number of input variables** (i.e., dimensionality) of the function. The curse of dimensionality refers to various phenomena that arise when analyzing and organizing data in high-dimensional spaces that do not occur in low-dimensional settings such as the three-dimensional physical space of everyday experience.

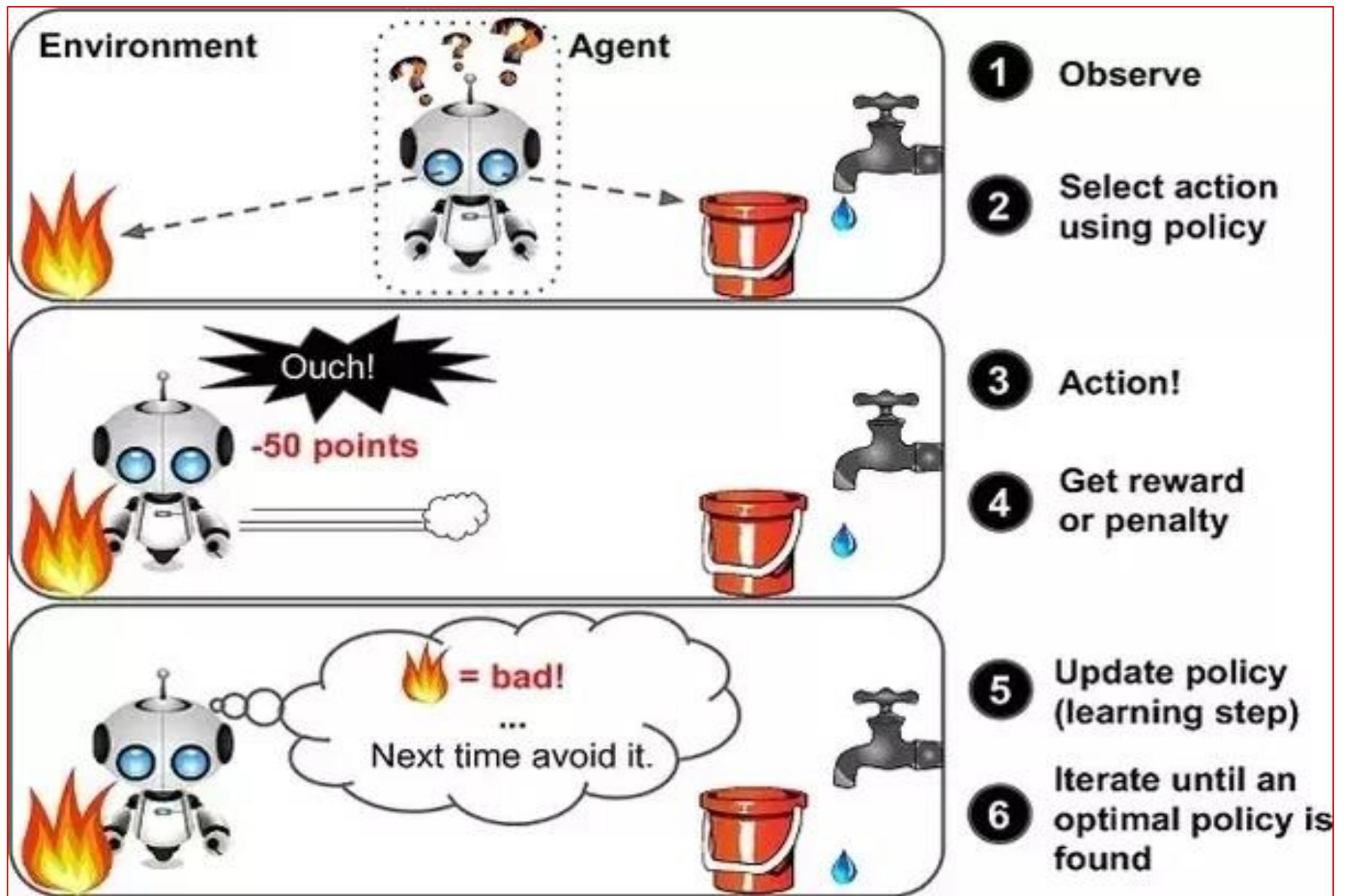


Fig: A Brief Overview of Reinforcement Learning

THE DEEP LEARNING PROCESS

In deep learning applications, a data scientist or other analyst:

- 1 Understands problem and whether deep learning is a good fit.
- 2 Identifies relevant data sets and prepares them for analysis.
- 3 Chooses the type of deep learning algorithm to use.

- 4 Trains algorithm on large amount of labeled data.
- 5 Tests the model's performance against unlabeled data.



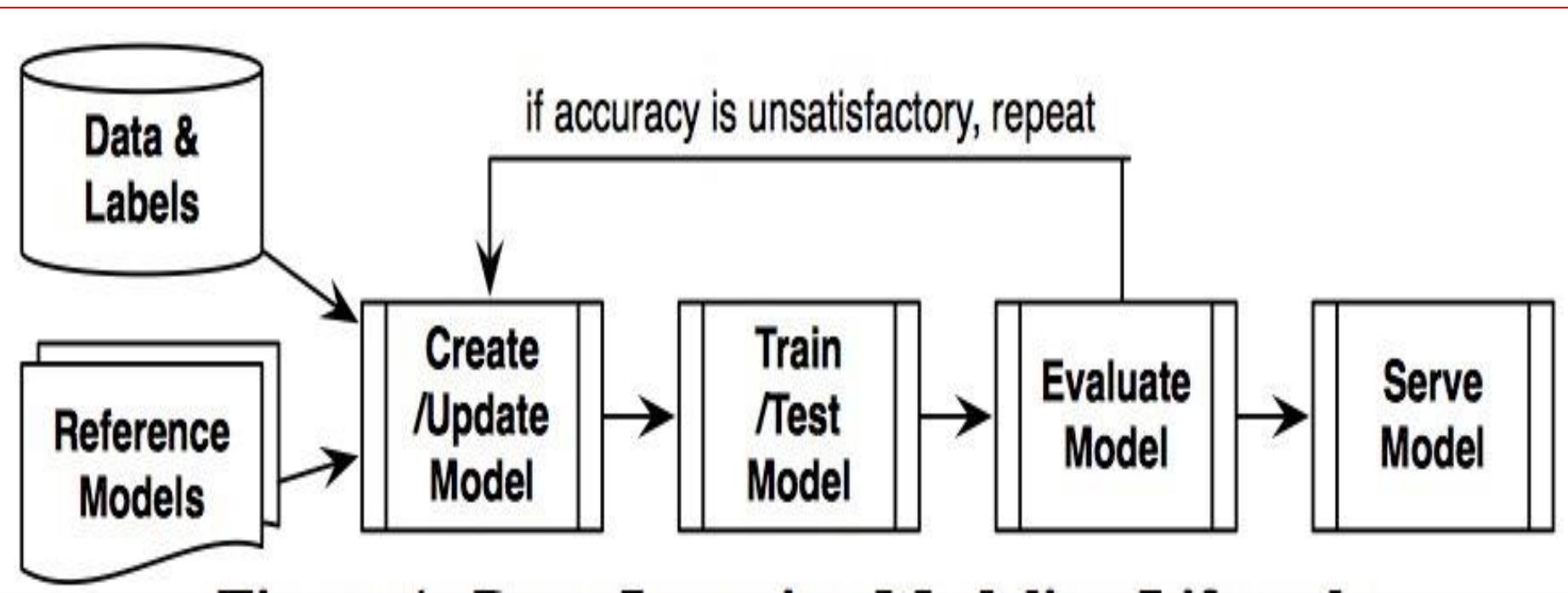


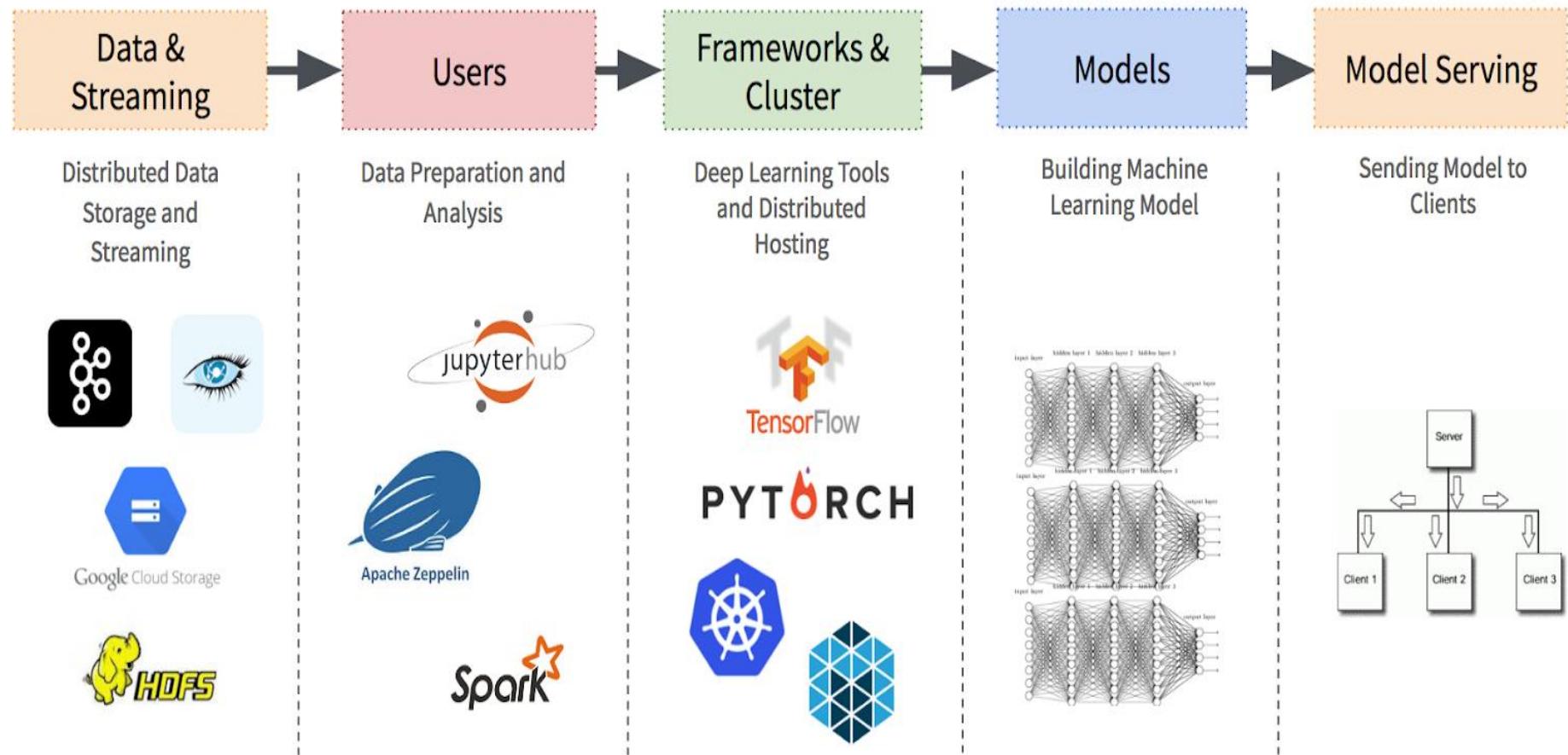
Fig: Deep Learning Modeling Lifecycle

Deep Learning Pipeline



Monitoring & Operations

TensorBoard





ML and DL Tools

ML PROGRAMMING LANGUAGES



python



MACHINE LEARNING TOOLS



TensorFlow



scikit-learn



Weka

Machine learning software

DEEP LEARNING TOOLS



Keras



PyTorch

ANALYTICAL TOOLS



Apache
Spark



Apache
hadoop
MapReduce

VISUALISATION TOOLS



matplotlib



Seaborn



JupyterHub

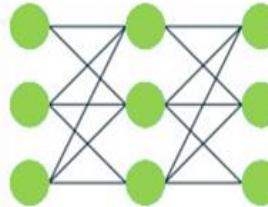
MACHINE LEARNING



INPUT



FEATURE EXTRACTION



CLASSIFICATION

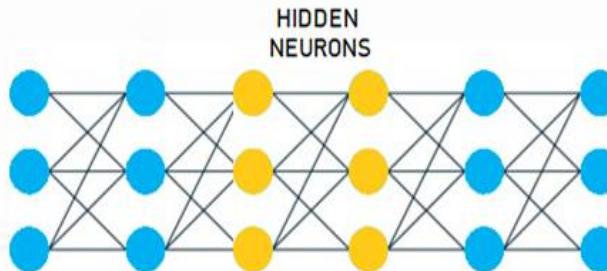
CAR
NOT CAR

OUTPUT

DEEP LEARNING



INPUT



FEATURE EXTRACTION + CLASSIFICATION

CAR
Color: Red
Make: Ford
Model: Mustang
NOT CAR

OUTPUT

Deep Learning Vs Machine Learning

Factors

Data Requirement

Deep Learning

Requires large data

Accuracy

Provides high accuracy

Training Time

Takes longer to train

Hardware Dependency

Requires GPU to train properly

Hyperparameter Tuning

Can be tuned in various
different ways.

Machine Learning

Can train on lesser data

Gives lesser accuracy

Takes less time to train

Trains on CPU

Limited tuning capabilities

	Deep Learning	Machine Learning
Data	Needs a big dataset	Performs well with a small to a medium dataset
Hardware requirements	Requires machines with GPU	Works with low-end machines
Engineering peculiarities	Needs to understand the basic functionality of the data	Understands the features and how they represent the data
Training time	Long	Short
Processing time	A few hours or weeks	A few seconds or hours
Number of algorithms	Few	Many
Data interpretation	Difficult	Some ML algorithms are easy to interpret, whereas some are hardly possible

- ✓ **Perceptrons:** The perceptron is an algorithm for supervised learning of binary classifiers. It is a type of linear classifier, i.e. a classification algorithm that makes its predictions based on a linear predictor function combining a set of weights with the feature vector.
- ✓ **Learning, Epoch, Batch Rate:** The learning rate controls how quickly the model is adapted to the problem. Smaller learning rates require more training epochs given the smaller changes made to the weights each update, whereas larger learning rates result in rapid changes and require fewer training epochs.
- ✓ The **batch size** is a number of samples processed before the model is updated. The number of epochs is the number of complete passes through the training dataset. The size of a batch must be more than or equal to one and less than or equal to the number of samples in the training dataset.

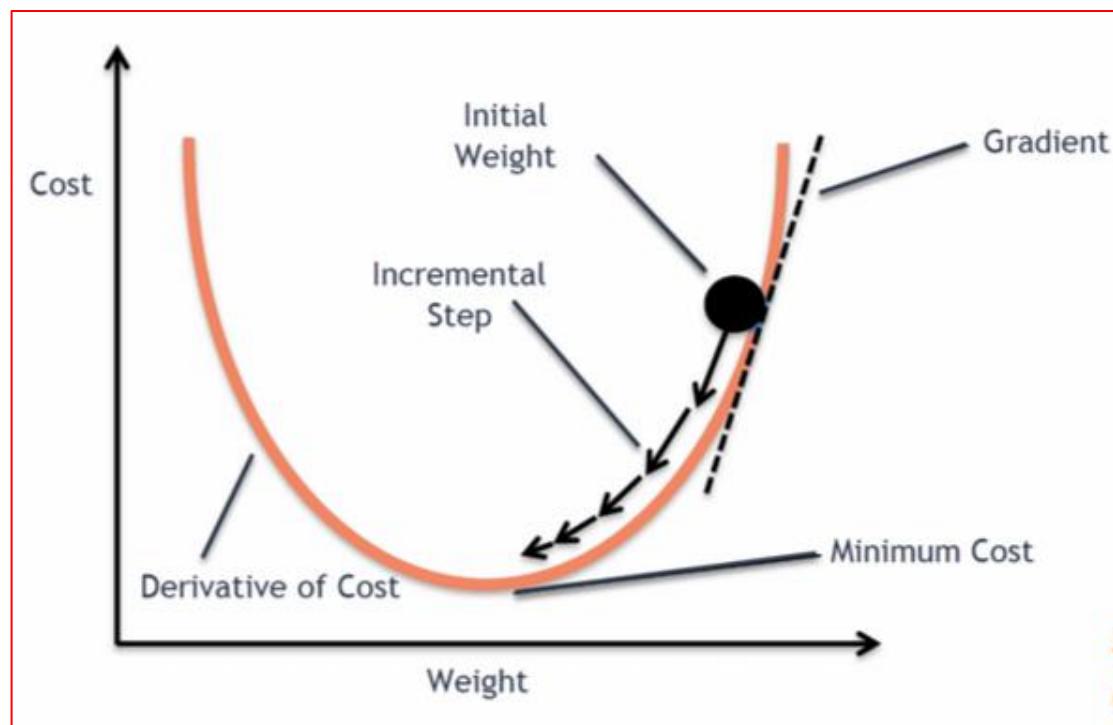
- ✓ The **batch size** is a hyperparameter of gradient descent that controls the number of training samples to work through before the model's internal parameters are updated. The number of **epochs** is a hyperparameter of gradient descent that controls the number of complete passes through the training dataset.
- ✓ **Activation Function:** the activation function of a node defines the output of that node given an input or set of inputs. A standard integrated circuit can be seen as a digital network of activation functions that can be "ON" or "OFF", depending on input
- ✓ **Single Layer Perceptron:** A single layer perceptron (SLP) is a feed-forward network based on a threshold transfer function. SLP is the simplest type of artificial neural networks and can only classify linearly separable cases with a binary target (1 , 0).

- ✓ **Limitation of Single Layer Perceptron:** A "single-layer" perceptron **can't implement XOR**. The reason is because the classes in XOR are not linearly separable. You cannot draw a straight line to separate the points $(0,0), (1,1)$ from the points $(0,1), (1,0)$. Led to invention of multi-layer networks.
- ✓ **Importance of Multilayer Perceptrons:** Multilayer networks **solve the classification problem for non linear sets by employing hidden layers**, whose neurons are not directly connected to the output.
- ✓ The additional hidden layers can be interpreted geometrically as additional hyper-planes, which enhance the separation capacity of the network.
- ✓ MLPs are **useful in research for their ability to solve problems stochastically**, which often allows approximate solutions for extremely complex problems like fitness approximation.

- ✓ **Pre-activation:** Pre-activation represented by 'a': It is a weighted sum of inputs plus the bias. Activation represented by 'h': Activation function is non-linear function
- ✓ **Activation Function:** an activation function is a function that is added into an artificial neural network in order to help the network learn complex patterns in the data. When comparing with a neuron-based model that is in our brains, the activation function is at the end deciding what is to be fired to the next neuron.
- ✓ **Back Propagation and why is it used:** Backpropagation is an algorithm used to calculate derivatives quickly. Artificial neural networks use backpropagation as a learning algorithm to compute a gradient descent with respect to weights. ... The algorithm gets its name because the weights are updated backwards, from output towards input.

✓ **Gradient descent:** Gradient descent is a first-order iterative optimization algorithm for finding a local minimum of a differentiable function. Gradient Descent is an optimization algorithm for finding a local minimum of a differentiable function. Gradient descent is simply used in machine learning to find the values of a function's parameters (coefficients) that minimize a cost function as far as possible.

Fig: Learning to learn gradient descent by gradient descent



- ✓ **Use Cases of Deep Learning:** Deep Learning use cases have been widely used for knowledge discovery and Predictive Analytics.
- ✓ For example, Google uses DL to build powerful voice- and image-recognition algorithms. Netflix and Amazon use DL in their recommendation engines, and MIT researchers use DL for Predictive Analytics.



Top Machine Learning Use Cases

- Face Unlock in Smartphones
- Selfie Filters
- Networking
- Cab Booking
- Hey Siri/Google
- Personalized Marketing
- G-mail Spam Alert
- Play Store Recommendation
- Online Food Delivery Portals

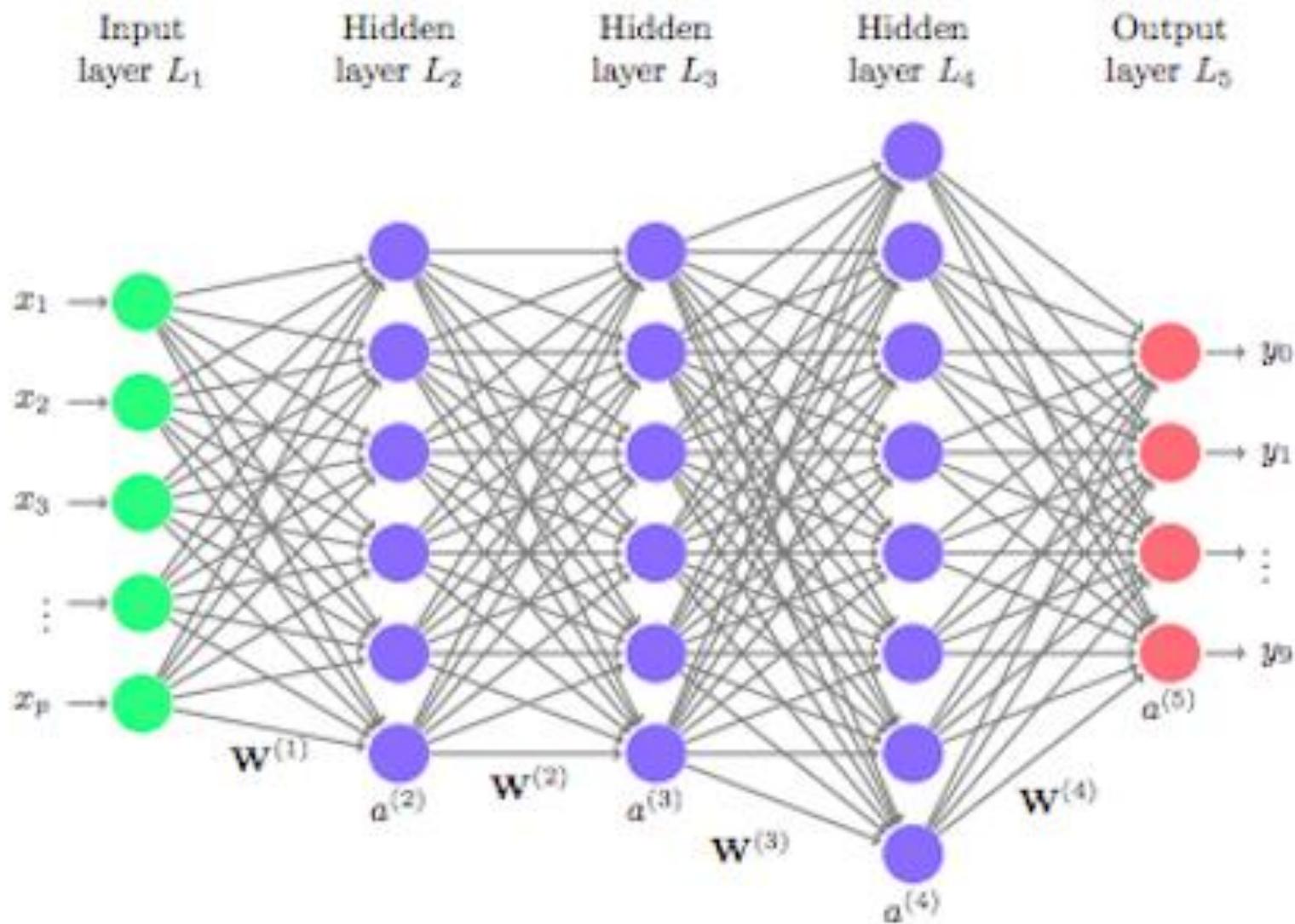
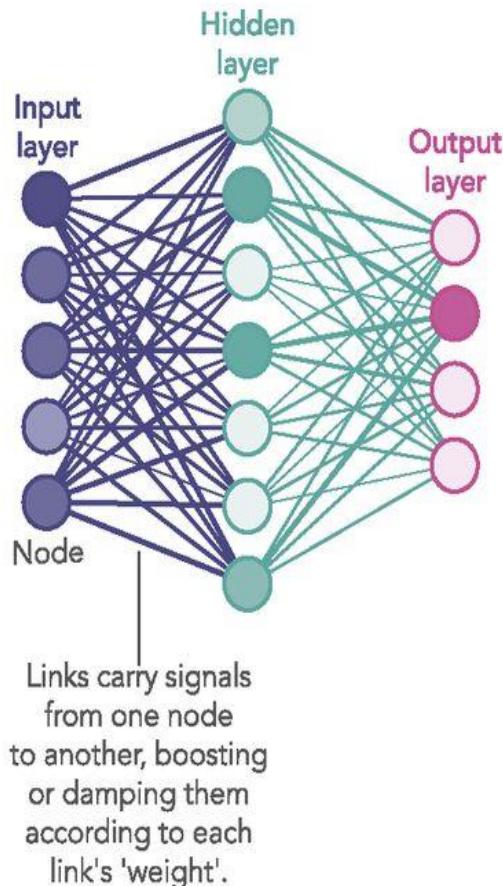


Fig: Deep Learning Process

1980S-ERA NEURAL NETWORK



DEEP LEARNING NEURAL NETWORK

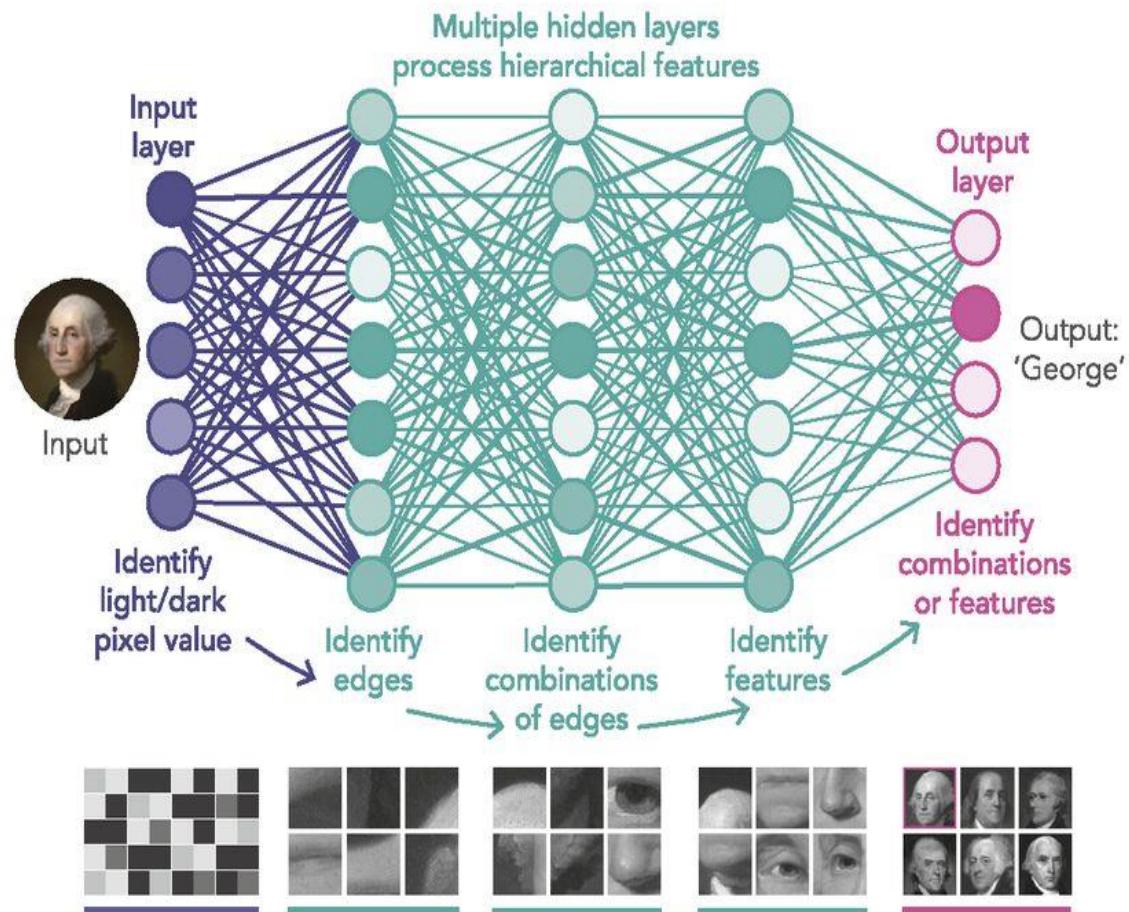


Fig: Deep Learning Process

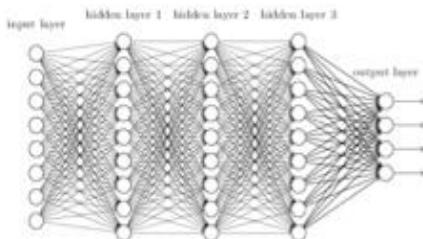
Deep Learning Algorithms

providing lift for classification and forecasting models

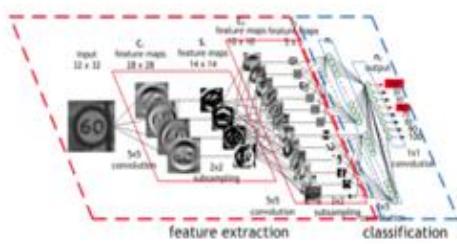
feature extraction and classification of images

for sequence of events, language models, time series, etc.

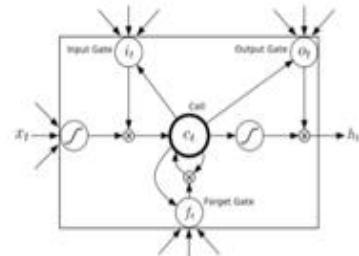
Deep Neural Networks



Convolutional Neural Networks



Recurrent Neural Networks



Deep Learning Models



Supervised Models

Convolutional
Neural Networks

Recurrent Neural
Networks

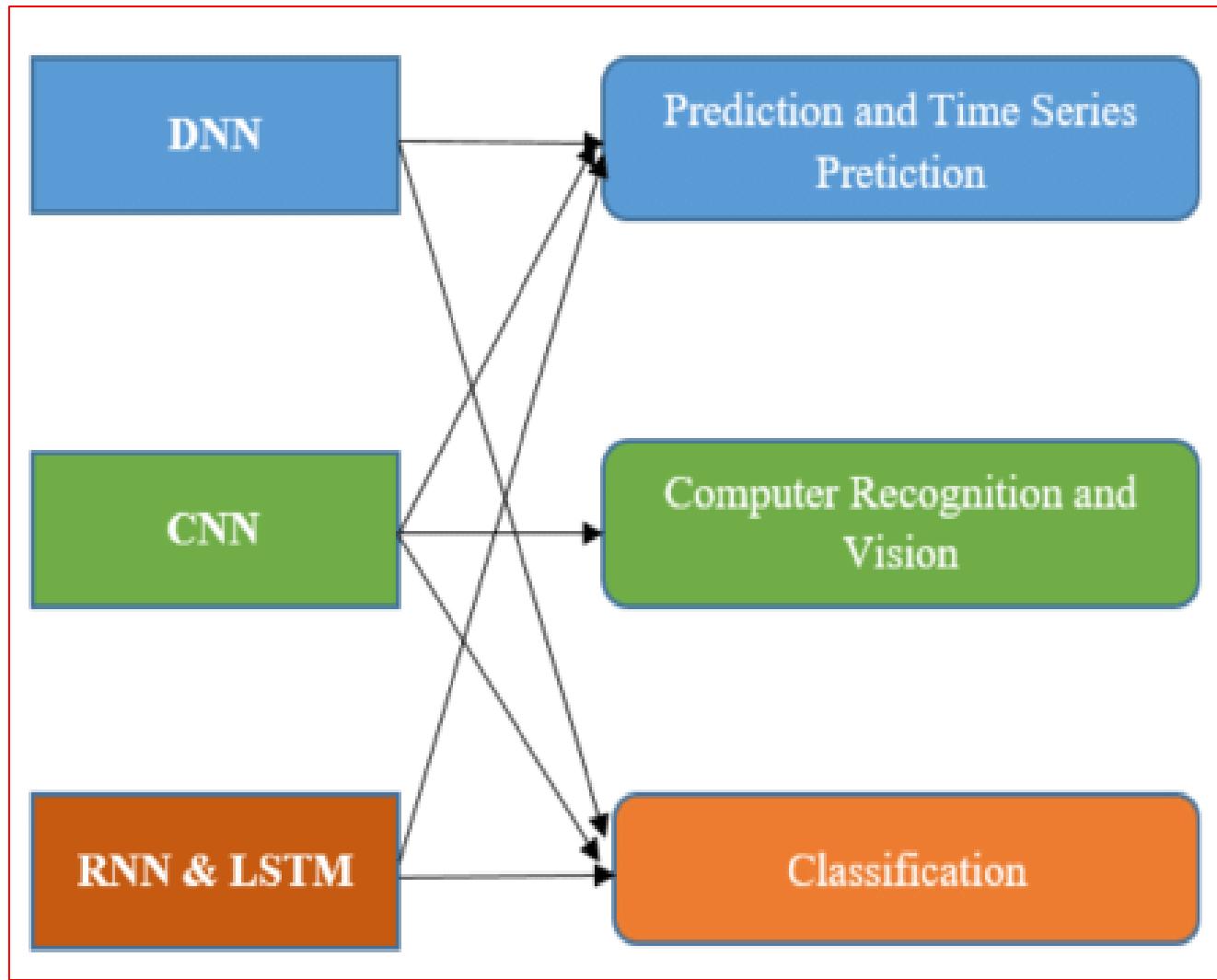
Classic Neural
Networks

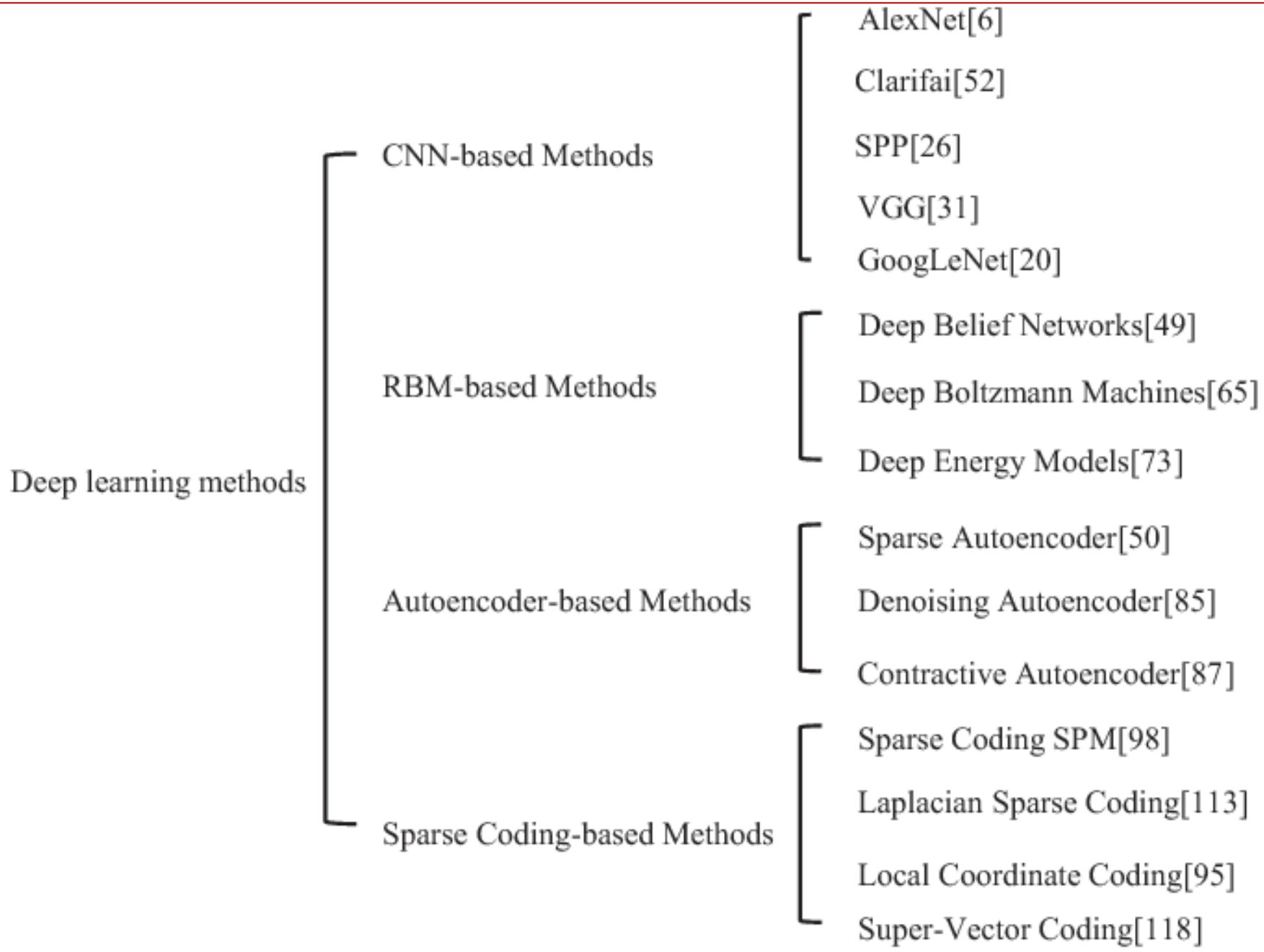
Unsupervised Models

Self-Organizing
Maps

AutoEncoders

Boltzmann
Machines





Multiply Rule	$\frac{d}{dx}(c u) = c \frac{du}{dx}$
Power Rule	$\frac{d}{dx}(x^n) = n x^{n-1}$
Sum Rule	$\frac{d}{dx}(u + v) = \frac{du}{dx} + \frac{dv}{dx}$
Difference Rule	$\frac{d}{dx}(u - v) = \frac{du}{dx} - \frac{dv}{dx}$
Product Rule	$\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$
Quotient Rule	$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$

1. **CNN:** A Convolutional Neural Network (CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data.
2. **RNN:** Recurrent Neural Networks (RNN) are a type of Neural Network where the output from the previous step is fed as input to the current step. RNN's are mainly used for, Sequence Classification - Sentiment Classification & Video Classification. Sequence Labelling - Part of speech tagging & Named entity recognition.
3. **LSTM:** Long Short-Term Memory (LSTM) is an artificial recurrent neural network (RNN) architecture used in the field of deep learning. LSTM networks are well-suited to classifying, processing and making predictions based on time series data, since there can be lags of unknown duration between important events in a time series.
4. **GAN:** A Generative Adversarial Network (GAN) is a machine learning (ML) model in which two neural networks compete with each other to become more accurate in their predictions. GANs typically run unsupervised and use a cooperative zero-sum game framework to learn.

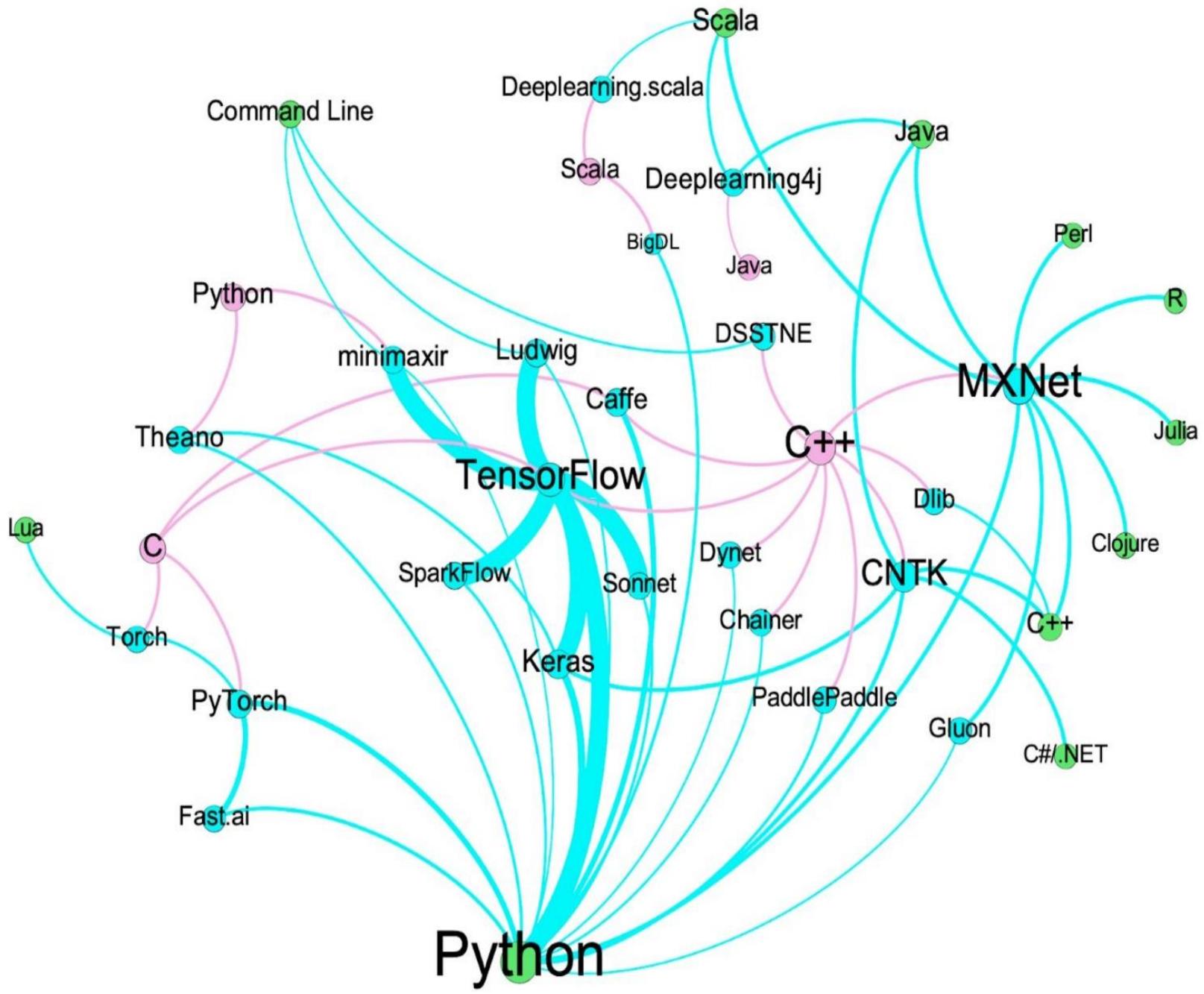
✓ **Top Open Source Deep Learning Tools:** Of the various deep learning tools available, these are the top freely available ones:

1. **TensorFlow:** one of the best frameworks, TensorFlow is used for natural language processing, text classification and summarization, speech recognition and translation and more.
2. **Microsoft Cognitive Toolkit:** Most effective for image, speech and text-based data, MCTK supports both CNN and RNN.
3. **Caffe:** One of the deep learning tools built for scale, Caffe helps machines to track speed, modularity and expression.

- 4. Chainer:** A Python-based deep learning framework, Chainer provides automatic differentiation APIs based on the define-by-run approach
- 5. Keras:** Again, a framework that can work both on CNN and RNN, Keras is a popular choice for many.
- 6. Deplearning4j:** Also a popular choice, Deplearning4j is a JVM-based, industry-focused, commercially supported, distributed deep-learning framework.

✓ Deep Learning code libraries: Python Deep Learning Libraries are

1. TensorFlow,
2. PyTorch
3. Apache MXNet



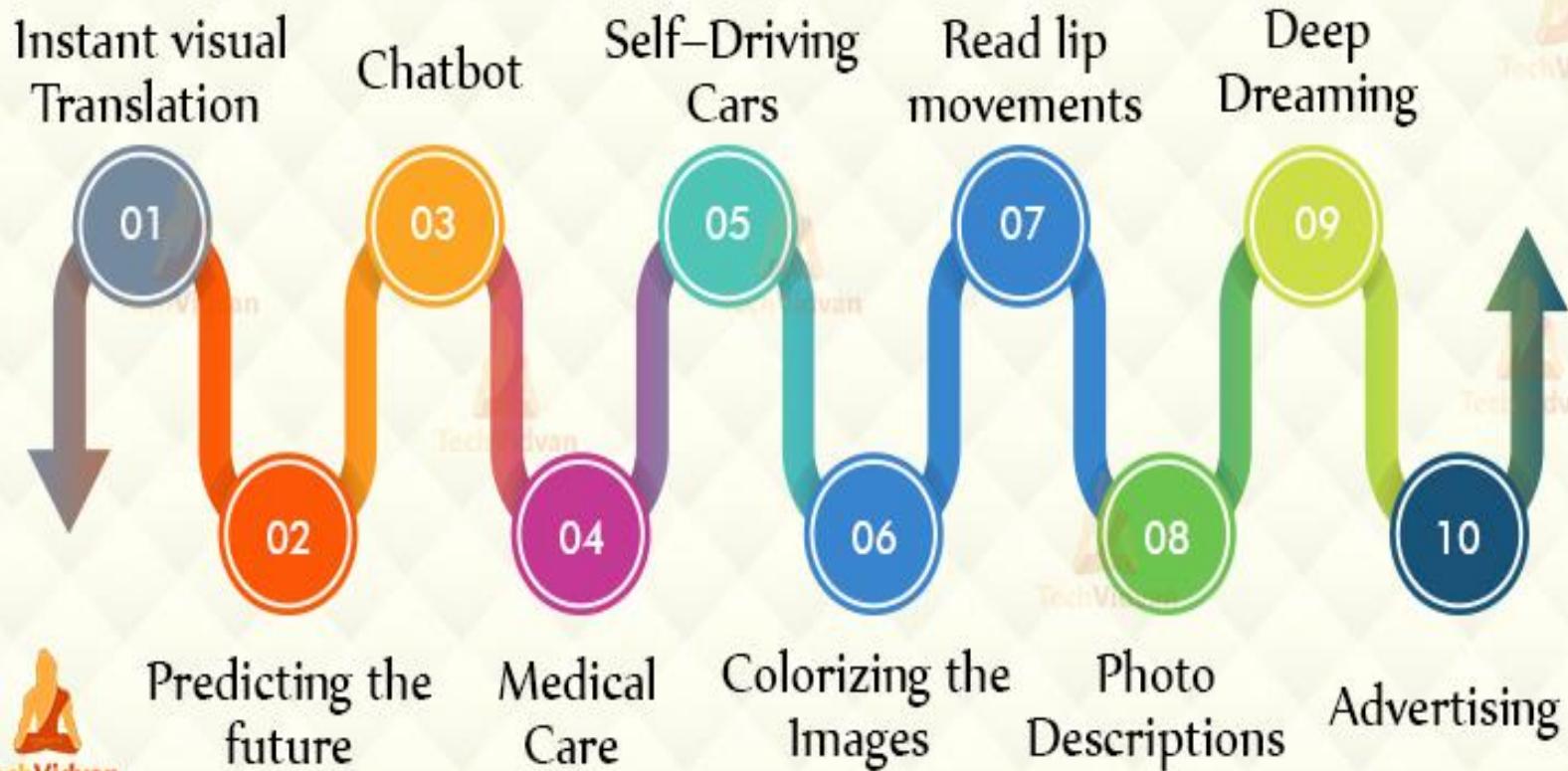


Fig: Applications of Deep Learning

5 Application Areas of Data Science



10 Fascinating Applications of Deep Learning



Consumers
Products
Reviews

E-commerce



Problems
Systems
Units
Scheduling
Detection

Manufacturing



ion
ing
alue

Banking



Healthcare



Transport



Finance

- Medical Imaging
- Drug Discovery
- Bioinformatics
- Virtual Assistants

- Self Driving Cars
- Enhanced Driver Assistance
- Car Monitoring Systems
- Enhancing the Driver Experience

- Customer Segmentation
- Strategic Decision Making
- Algorithmic Trading
- Risk Analytics

Data Science Applications

Data Science Real-Life Use Cases

01

What Sells Most Ice-Creams?

02

Learning to Speak

03

Recognizing Defects

04

Using Suggestions to Make
Better Decisions

Machine Learning

- Classification
- Regression
- Reinforcement Learning
- Deep Learning
- Clustering
- Dimensionally reduction

Data Analysis

- Feature Engineering
- Data Wrangling
- EDA

Math

- Statistics
- Linear Algebra
- Differential Calculus

Programming Language

- Python
- R
- Java

Data Visualization

- Tableau
- Power BI
- Matplotlib
- GG Plot
- Seaborn

IDE

- Pycharm
- Jupyter
- Colaboratory
- Spyder
- R-Studio

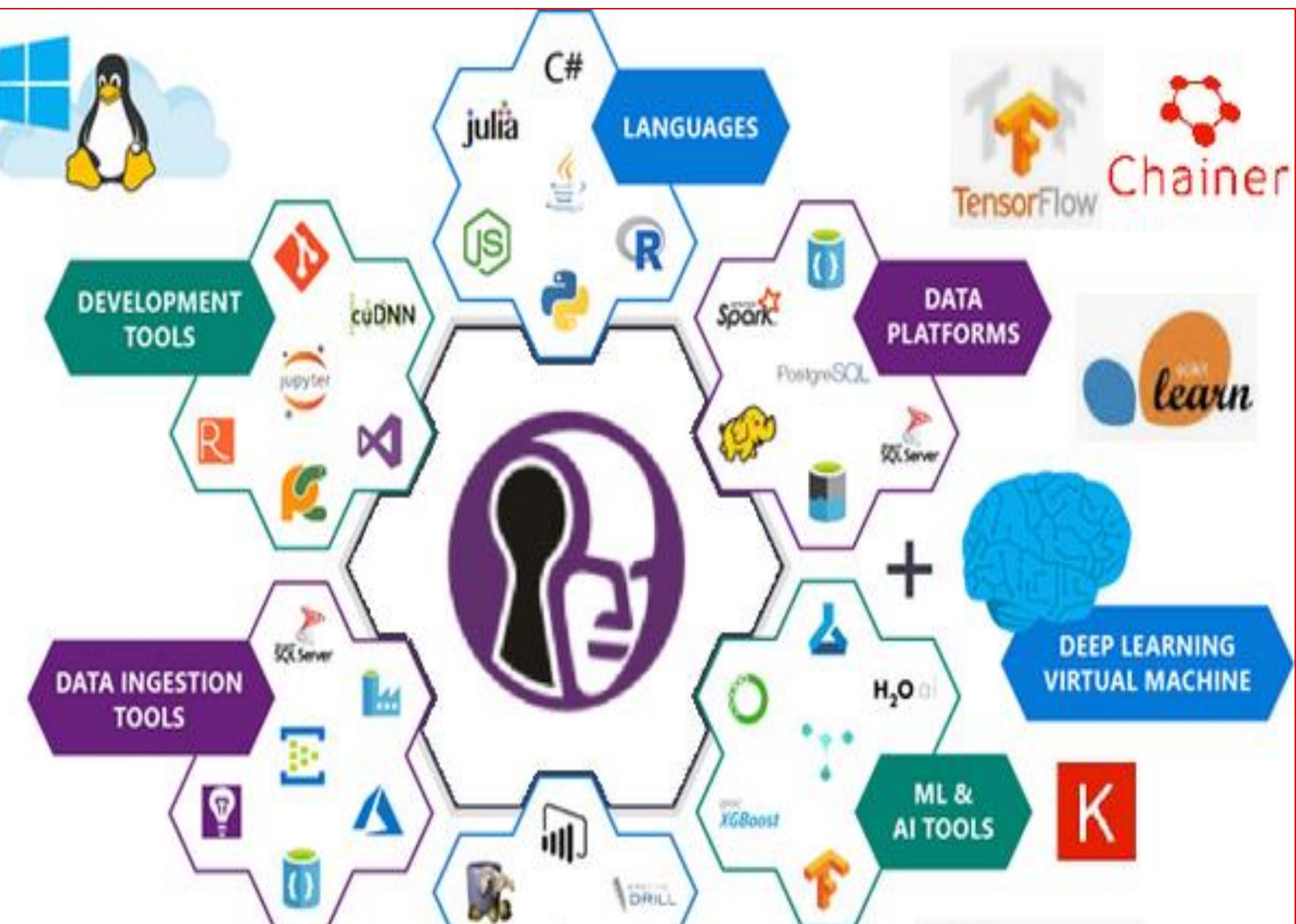
Web Scraping

- BeautifulSoup
- Scrapy
- URLLIB

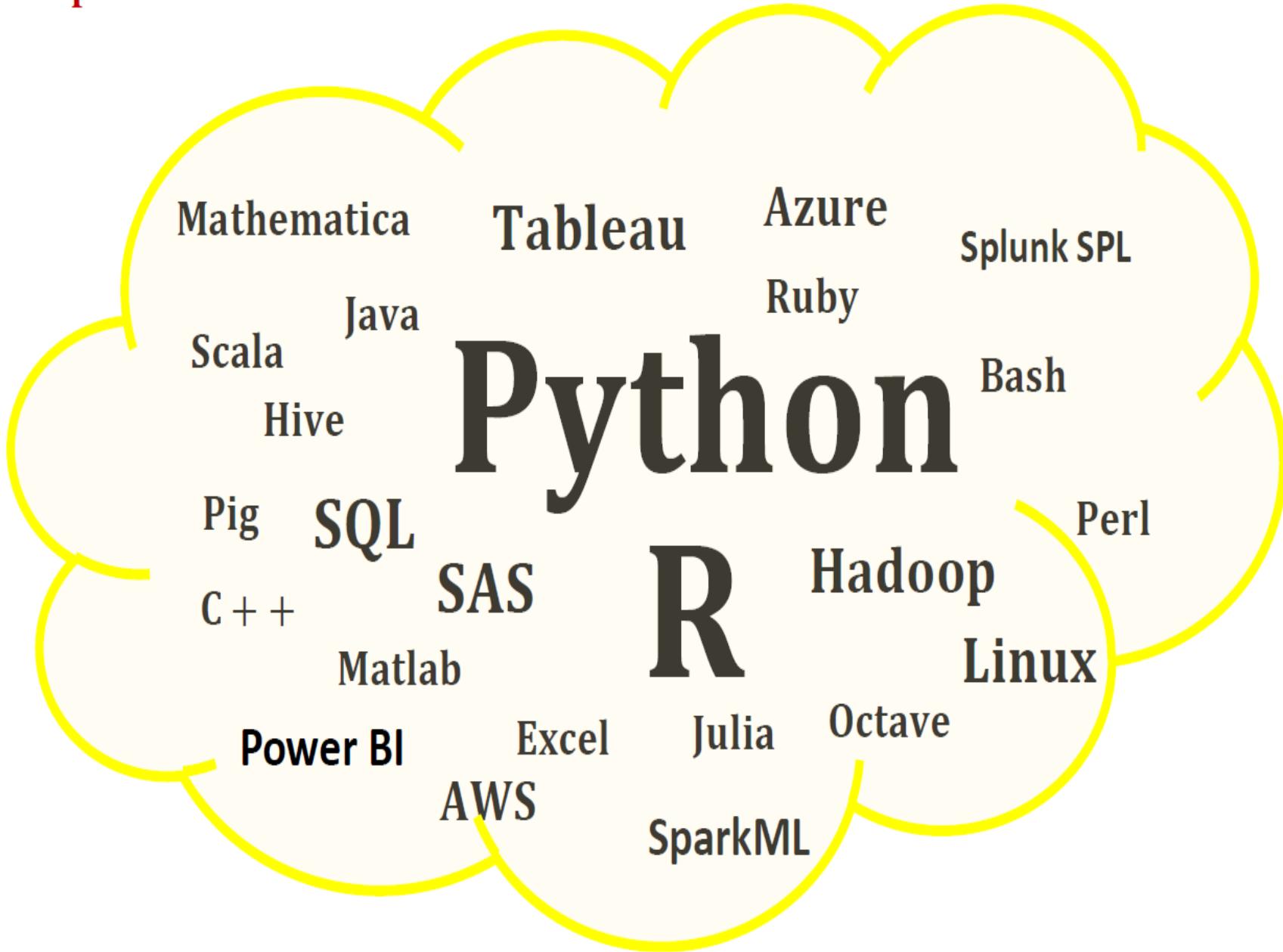


Deploy

- AWS
- AZURE



Soup of Desired Technical Skills Mentioned in some Data Scientists Job Ads



✓ Research issues on Data Science

1. Sentiment Analysis in Data using Machine Learning Algorithms
2. Opinion mining Analysis in Data using Machine Learning Algorithms
3. Predictive mining Analysis in Data using Machine Learning Algorithms
4. Post-Clustering Analysis in Data using Machine Learning Algorithms
5. Pre-Clustering Analysis in Data using Machine Learning Algorithms
6. How we can capture and deliver data to right people in real-time
7. How we can handle variety of forms and data
8. How we can store and analyze data given its size and computational capacity.

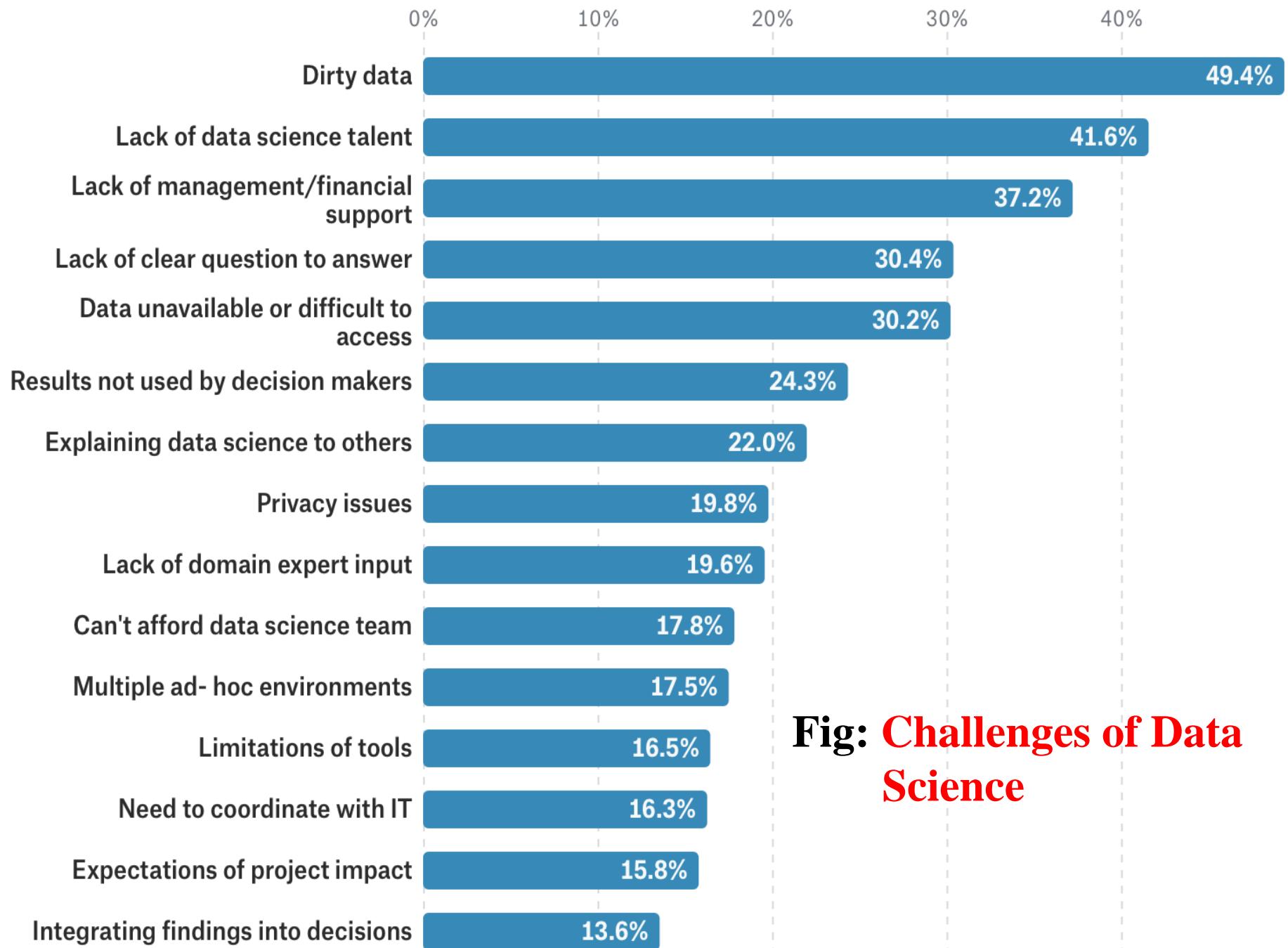
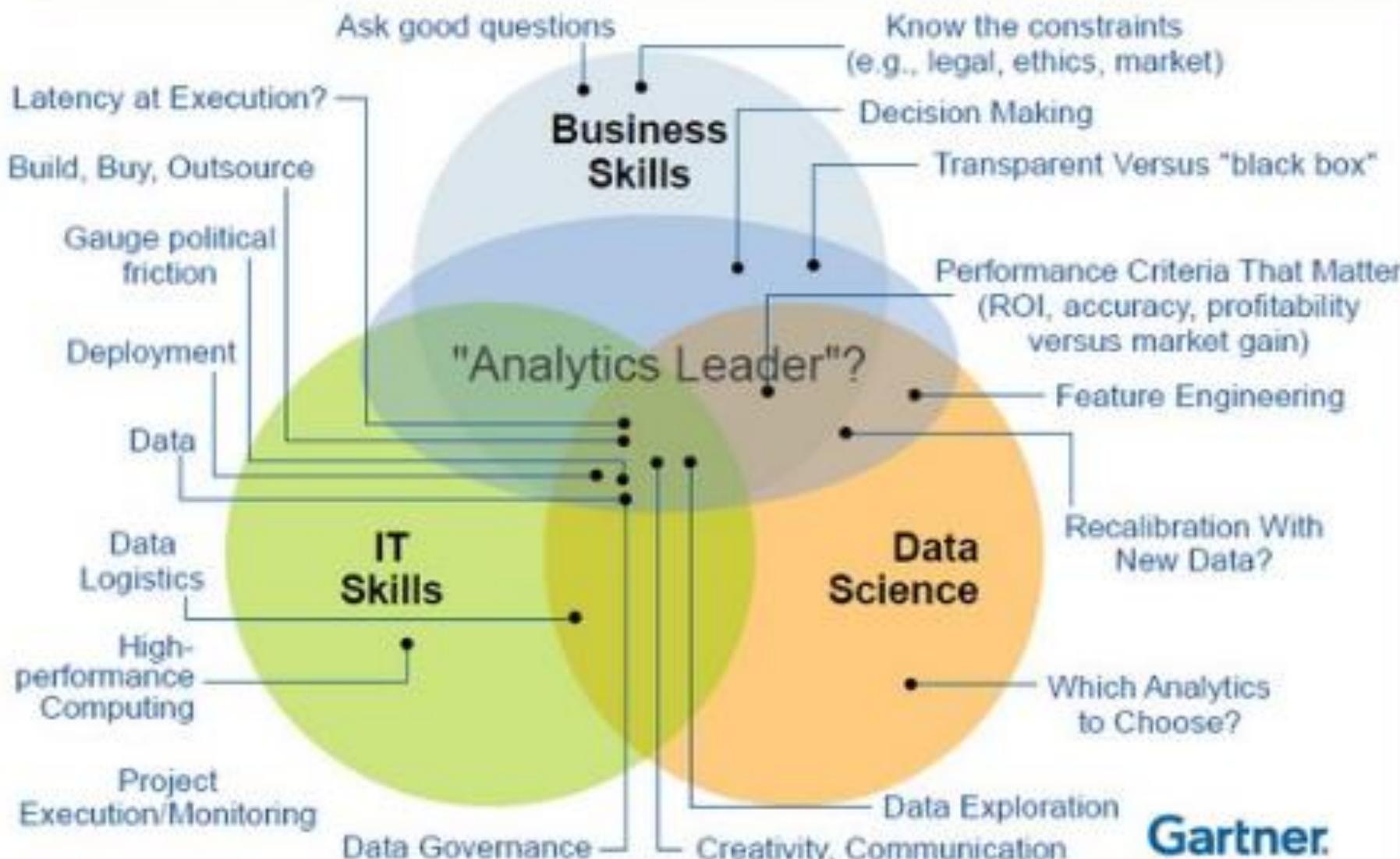


Fig: Challenges of Data Science

Driving the Success of Data Science Solutions: Skills, Roles and Responsibilities ...



Gartner

Which is better to start AI,ML or DL?



Artificial Intelligence

Any Technique which enables computers to mimic human behavior.

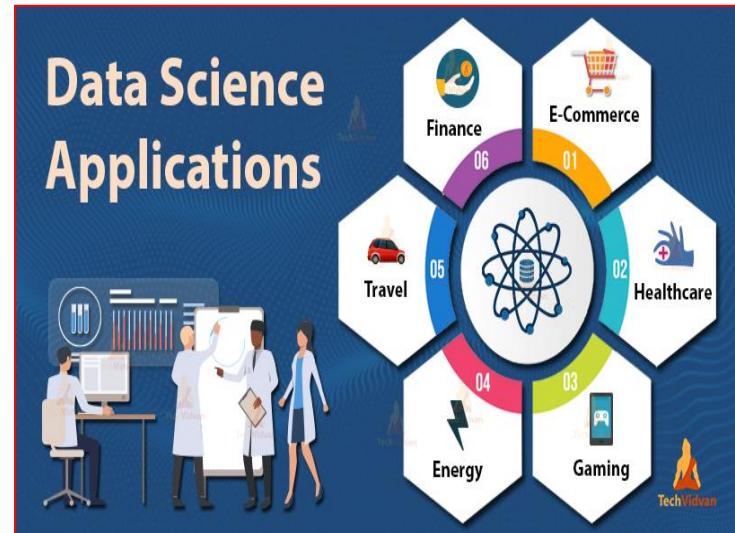
Machine Learning

Subset of AI Techniques which use Statistical Methods to Enable Machines to Improve with Experiences.

Deep Learning

Subset of ML which make the Computation of Multi-layer Neural Networks Feasible.

Deep Learning Applications



1. Covid-19 virus prediction & detection
2. Covid-19 strain virus prediction & detection
3. Ebola virus prediction & detection
4. Prostate cancer prediction & detection
5. Breast cancer prediction & detection
6. Lung cancer prediction & detection

✓ **Deep Learning code Libraries:** Python Libraries for Machine Learning in 2021 are

1. NumPy
2. SciPy
3. Scikit-learn(SK Learn)
4. Theano
5. TensorFlow
6. Keras
7. PyTorch
8. Pandas

✓ Top 5 Classification Algorithms in Machine Learning

1. Logistic Regression
2. Decision Tree
3. Support Vector Machines
4. Naive Bayes
5. K-Nearest Neighbors

1. Logistic Regression

- ✓ Logistic regression is a **statistical model** that in its basic form uses a logistic function to model a binary dependent variable, although many more complex extensions exist.
- ✓ It is estimating the parameters of a logistic model (a form of **binary regression**).
- ✓ Logistic regression is used when the dependent variable is **binary in nature**.
- ✓ **Logistic regression** measures the relationship between the categorical dependent variable and one or more independent variables by estimating probabilities using a **logistic function**, which is the cumulative distribution function of **logistic distribution**.

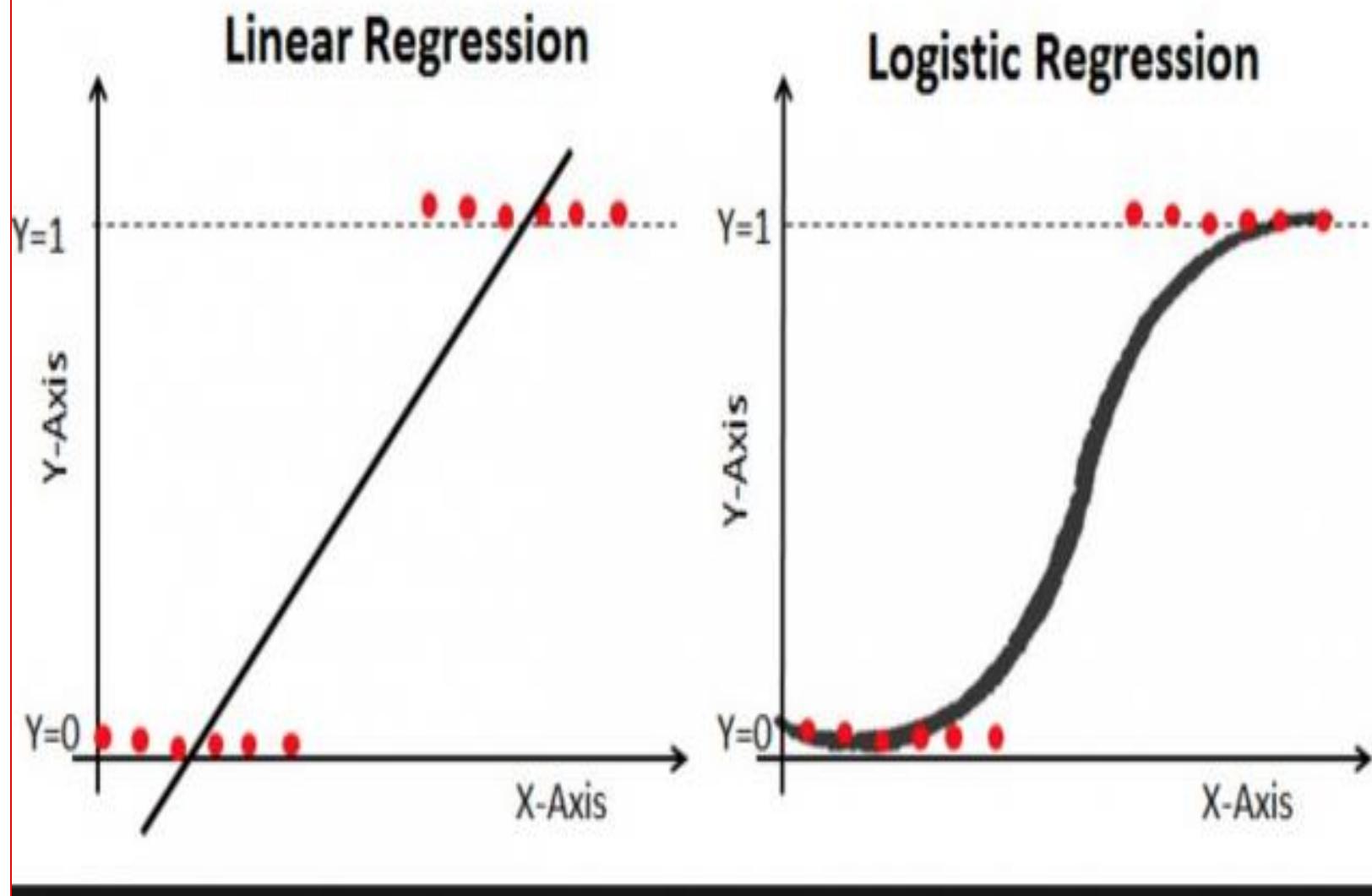


Fig: Linear Vs Logistic Regression. Linear Regression

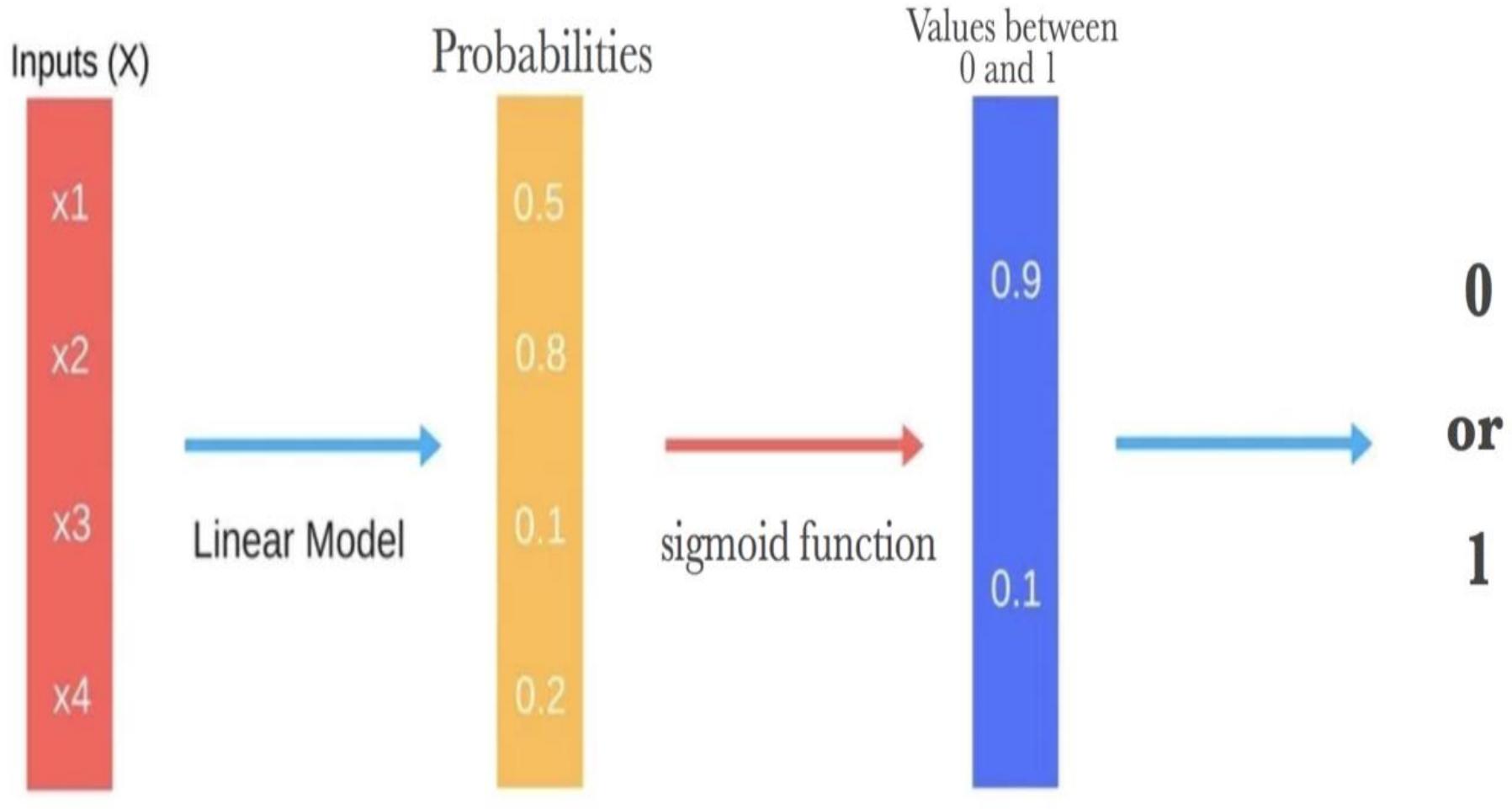


Fig: Logistic Regression Algorithm

1) Logistic Regression

```
import matplotlib.pyplot as plt
import numpy as np
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import classification_report, confusion_matrix
import matplotlib.pyplot as plt
x = np.arange(10).reshape(-1, 1)
y = np.array([0, 0, 0, 0, 1, 1, 1, 1, 1, 1])
print(x)
print(y)
model = LogisticRegression(solver='liblinear', random_state=0)
model.fit(x, y)
LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
                   intercept_scaling=1, l1_ratio=None, max_iter=100,
                   multi_class='warn', n_jobs=None, penalty='l2',
                   random_state=0, solver='liblinear', tol=0.0001, verbose=0,
                   warm_start=False)
#model = LogisticRegression(solver='liblinear', random_state=0).fit(x, y)
print("Predicted Classes" ,model.classes_)
print("Intercept " ,model.intercept_)
print("Coefient Value " , model.coef_)
print("Predicted Values " ,model.predict_proba(x))
plt.plot(model.predict_proba(x))
plt.show()
```

```
srinu.asadi@controller:~$ python3 logistic.py
```

```
[[0]  
[1]  
[2]  
[3]  
[4]  
[5]  
[6]  
[7]  
[8]  
[9]]
```

```
[0 0 0 0 1 1 1 1 1]
```

```
Predicted Classes [0 1]
```

```
Intercept [-1.04608067]
```

```
Coefficient Value [[0.51491375]]
```

```
Predicted Values
```

```
[[0.74002157 0.25997843]
```

```
[0.62975524 0.37024476]
```

```
[0.5040632 0.4959368 ]
```

```
[0.37785549 0.62214451]
```

```
[0.26628093 0.73371907]
```

```
[0.17821501 0.82178499]
```

```
[0.11472079 0.88527921]
```

```
[0.07186982 0.92813018]
```

```
[0.04422513 0.95577487]
```

```
[0.02690569 0.97309431]]
```

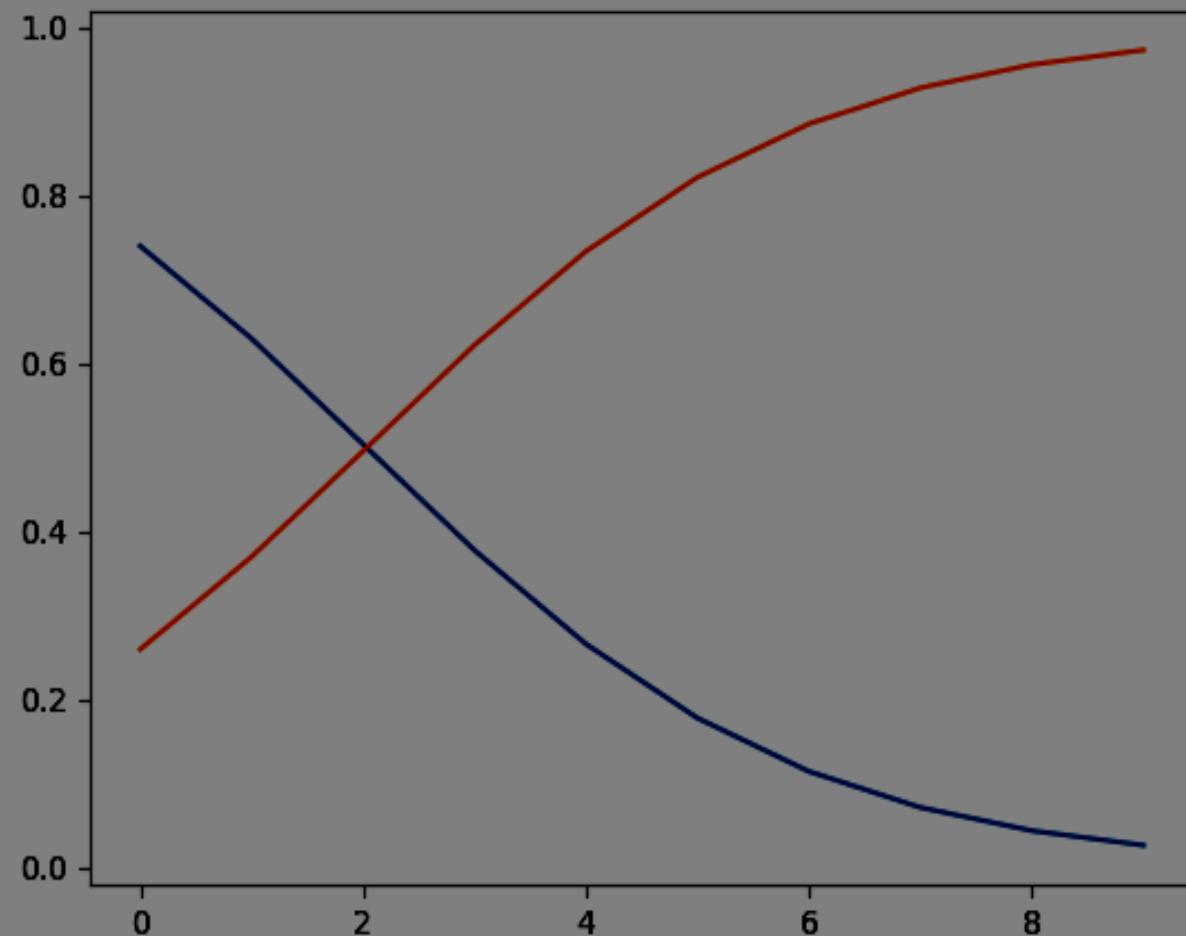


Fig: Logistic Regression Algorithm

- ✓ **2 - Decision Tree:** Decision tree is a flowchart-like tree structure, where each internal node (nonleaf node) denotes a test on an attribute, each branch represents an outcome of the test, and each leaf node (or terminal node) holds a class label.
- ✓ **Decision Tree** Induction is developed by [Ross Quinlan](#), decision tree algorithm known as [ID3](#) (Iterative Dichotomiser).
- ✓ Decision tree is a classifier in the form of a tree structure
 - ✓ **Decision node:** specifies a test on a single attribute
 - ✓ **Leaf node:** indicates the value of the target attribute
 - ✓ **Arc/edge:** split of one attribute
 - ✓ **Path:** a disjunction of test to make the final decision

✓ Classification by Decision Tree Induction consists of

1. Decision Tree Induction
2. Attribute Selection Measures
 - i. Information gain
 - ii. Gain ratio
 - iii. Gini index
3. Tree Pruning
4. Scalability and Decision Tree Induction

RID	age	income	student	credit_rating	<i>Class: buys_computer</i>
1	youth	high	no	fair	no
2	youth	high	no	excellent	no
3	middle_aged	high	no	fair	yes
4	senior	medium	no	fair	yes
5	senior	low	yes	fair	yes
6	senior	low	yes	excellent	no
7	middle_aged	low	yes	excellent	yes
8	youth	medium	no	fair	no
9	youth	low	yes	fair	yes
10	senior	medium	yes	fair	yes
11	youth	medium	yes	excellent	yes
12	middle_aged	medium	no	excellent	yes
13	middle_aged	high	yes	fair	yes
14	senior	medium	no	excellent	no

EX: Data Set in All Electronics Customer Database

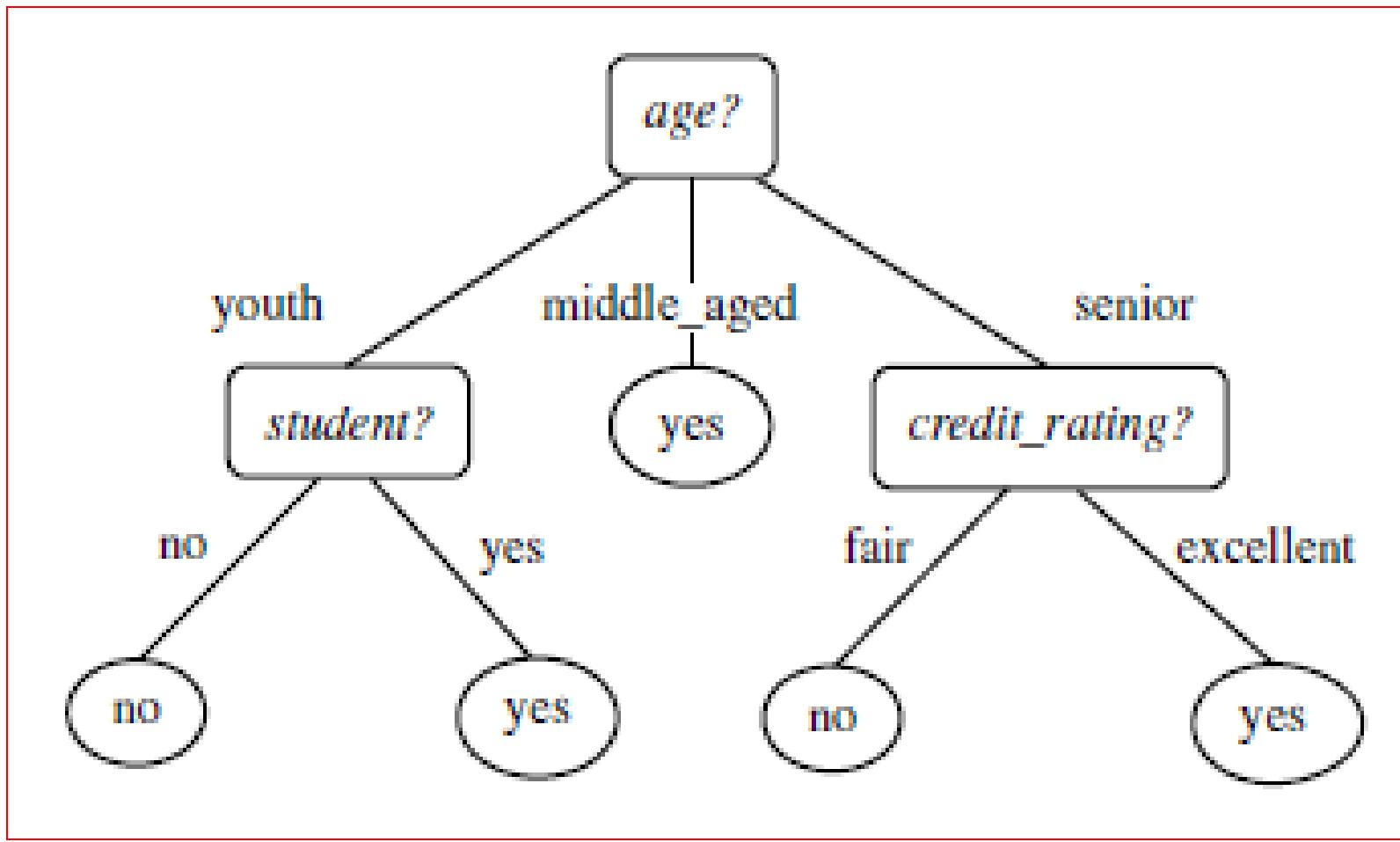


Fig: A Decision tree for the concept buys computer, indicating whether a customer at AllElectronics is likely to purchase a computer. Each internal (nonleaf) node represents a test on an attribute. Each leaf node represents a class (either buys computer = yes or buys computer = no).

Decision Tree Classification using Python

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns # %matplotlib inline #for encoding
from sklearn.preprocessing import LabelEncoder # for train test splitting
from sklearn.model_selection import train_test_split # for decision tree object
from sklearn.tree import DecisionTreeClassifier # for checking testing results
from sklearn.metrics import classification_report, confusion_matrix # for visualizing tree
from sklearn.tree import plot_tree
df = sns.load_dataset('iris') # reading the data
df.head()
df.info() # getting information of dataset
df.shape
df.isnull().any()
sns.pairplot(data=df, hue='species') # let's plot pair plot to visualize the attributes all at once
sns.heatmap(df.corr()) # correlation matrix
target = df['species']
df1 = df.copy()
```

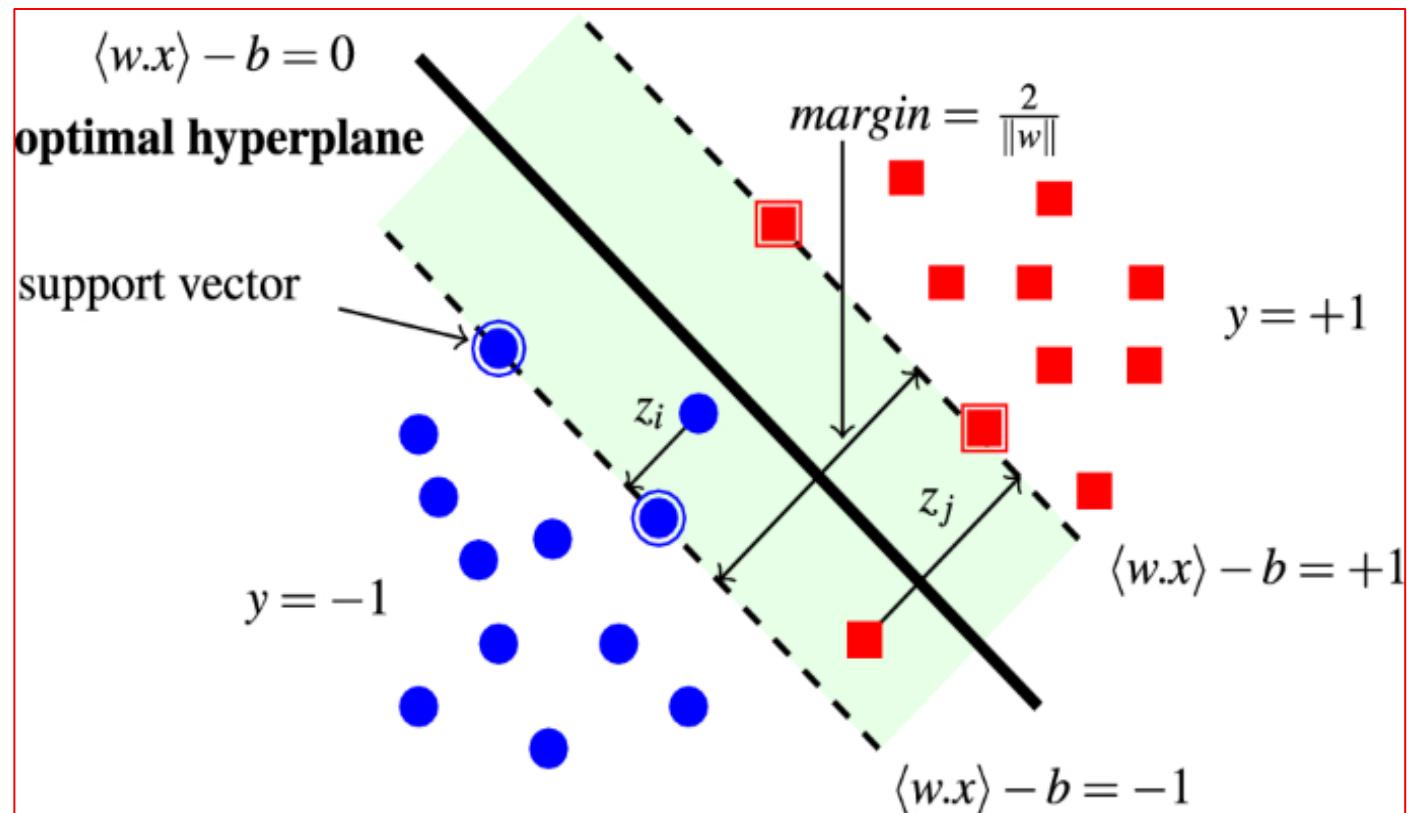
```
df1 = df1.drop('species', axis=1)
X = df1 # Defining the attributes
target
le = LabelEncoder() # label encoding
target = le.fit_transform(target)
target
y = target # Splitting the data - 80:20 ratio
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
print("Training split input-", X_train.shape)
print("Testing split input-", X_test.shape)
dtree = DecisionTreeClassifier() # Defining the decision tree algorithm
dtree.fit(X_train, y_train)
print('Decision Tree Classifier Created')
y_pred = dtree.predict(X_test) # Predicting the values of test data
print("Classification report - \n", classification_report(y_test, y_pred))
cm = confusion_matrix(y_test, y_pred)
plt.figure(figsize=(5, 5))
sns.heatmap(data=cm, linewidths=.5, annot=True, square=True, cmap='Blues')
plt.ylabel('Actual label')
plt.xlabel('Predicted label')
all_sample_title = 'Accuracy Score: {}'.format(dtree.score(X_test, y_test))
plt.title(all_sample_title, size=15)
# Visualising the graph without the use of graphviz
plt.figure(figsize = (20,20))
dec_tree      = plot_tree(decision_tree=dtree,    feature_names=df1.columns,    class_names
= ["setosa", "vercicolor", "verginica"], filled=True, precision=4, rounded=True)
```

```
C:\Users\Dr. Asadi\Downloads>python dt.py
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column           Non-Null Count  Dtype  
--- 
 0   sepal_length    150 non-null    float64 
 1   sepal_width     150 non-null    float64 
 2   petal_length    150 non-null    float64 
 3   petal_width     150 non-null    float64 
 4   species         150 non-null    object  
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
Training split input- (120, 4)
Testing split input- (30, 4)
Decision Tree Classifier Created
Classification report -
      precision    recall  f1-score   support
 0          1.00     1.00     1.00      10
 1          1.00     1.00     1.00       9
 2          1.00     1.00     1.00      11

accuracy                           1.00      30
macro avg       1.00     1.00     1.00      30
weighted avg    1.00     1.00     1.00      30
```

```
C:\Users\Dr. Asadi\Downloads>
```

- ✓ **3. Support Vector Machine:** These are supervised learning models with associated learning algorithms that analyze data for classification and regression analysis.
- ✓ It is a supervised **machine** learning **algorithm** capable of performing classification, regression and even outlier detection.
- ✓ The linear **SVM** classifier works by drawing a straight line between two classes.



Support Vector Machine using Python

```
import pandas as pd  
from sklearn.model_selection import train_test_split  
from sklearn.svm import SVC
```

#Import scikit-learn metrics module for accuracy calculation

```
from sklearn import metrics  
from sklearn.metrics import classification_report, confusion_matrix
```

columns Variance,Skewness,Curtosis,Entropy,Class

Assign column names to the dataset

```
colnames = ['Variance', 'Skewness', 'Curtosis', 'Entropy', 'Class']  
url = "powerquality.csv"
```

Read dataset to pandas dataframe

```
powerqualitydata = pd.read_csv(url, names=colnames)  
X = powerqualitydata.drop('Class', axis=1)  
y = powerqualitydata['Class']
```

```
svclassifier = SVC(kernel='rbf') # selecting rbf kernel classifier  
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.20)  
svclassifier.fit(X_train, y_train)  
y_pred = svclassifier.predict(X_test)  
print(y_pred)
```

```
print(confusion_matrix(y_test, y_pred))  
print(classification_report(y_test, y_pred))
```

```
# Model Accuracy: how often is the classifier correct?  
print("Accuracy:", metrics.accuracy_score(y_test, y_pred))
```

```
# Model Precision: what percentage of positive tuples are labeled as such?  
print("Precision:", metrics.precision_score(y_test, y_pred))
```

```
C:\Users\Dr. Asadi\Downloads>python svm.py
[0 0 0 1 0 1 0 0 0 1 0 0 0 0 1 1 0 0 1 0 0 1 1 0 0 1 1 1 1 1 1 1 0 0 0 1 0 1 1
 1 0 0 1 0 0 0 1 1 0 0 1 0 1 0 0 0 1 0 0 1 1 1 1 0 1 1 1 0 0 0 0 1 0 0 0
 0 0 0 0 0 1 0 1 0 1 0 0 1 0 1 0 0 0 1 1 1 1 0 0 0 1 1 0 1 0 0 1 1 0 0
 0 1 1 0 1 1 0 1 0 1 0 0 0 0 1 1 1 0 0 1 1 0 0 1 1 1 1 0 1 0 0 1 1 1 0
 1 0 0 0 0 0 1 0 1 0 1 0 0 1 0 0 1 1 0 0 1 1 0 1 0 0 1 0 1 0 0 1 0 1 0 0
 1 0 0 0 0 1 1 1 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 1 0 1 1 0 1 1 1 1 1 0 1
 0 1 0 1 0 0 1 0 0 0 1 0 1 1 0 0 0 1 0 0 1 0 0 0 0 1 1 1 0 1 1 1 0 0 1 1
 0 0 0 1 1 0 0 0 1 0 1 0 1 1 1 0 0]
```

```
[[156 2]
 [ 0 117]]
```

	precision	recall	f1-score	support
0	1.00	0.99	0.99	158
1	0.98	1.00	0.99	117
accuracy			0.99	275
macro avg	0.99	0.99	0.99	275
weighted avg	0.99	0.99	0.99	275

```
Accuracy: 0.9927272727272727
```

```
Precision: 0.9831932773109243
```

```
Recall: 1.0
```

```
C:\Users\Dr. Asadi\Downloads>
```

4) Naive Bayes Technique: Naive Bayes classifiers are a collection of classification algorithms based on Bayes' Theorem.

✓ It is not a single algorithm but a family of algorithms where all of them share a common principle, i.e. every pair of features being classified is independent of each other.

✓ **Naive Bayes Tutorial (in 7 easy steps)**

Start 1: Start

Step 2: Separate By Class.

Step 3: Summarize Dataset.

Step 4: Summarize Data By Class.

Step 5: Gaussian Probability Density Function.

Step 6: Class Probabilities.

Step 7: Stop

Naive Bayes

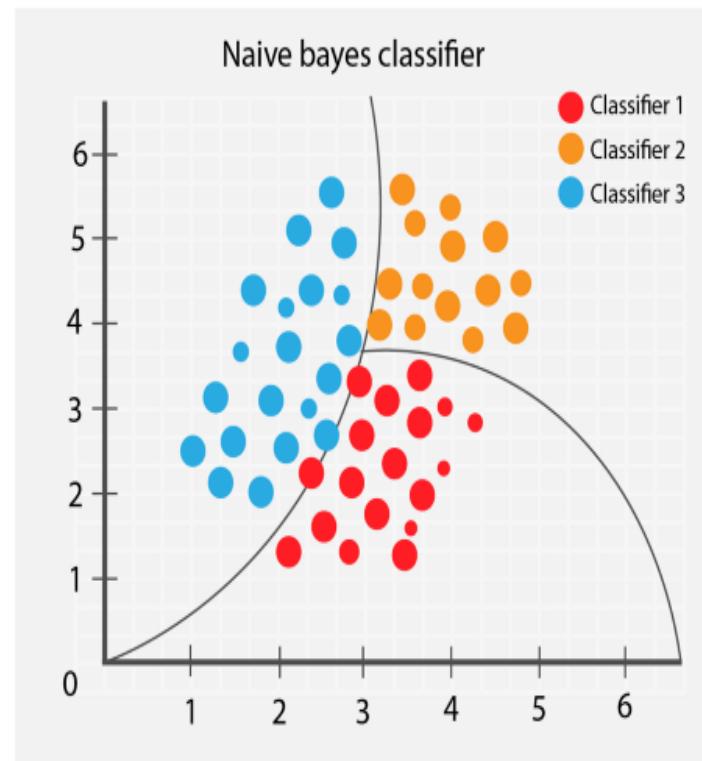


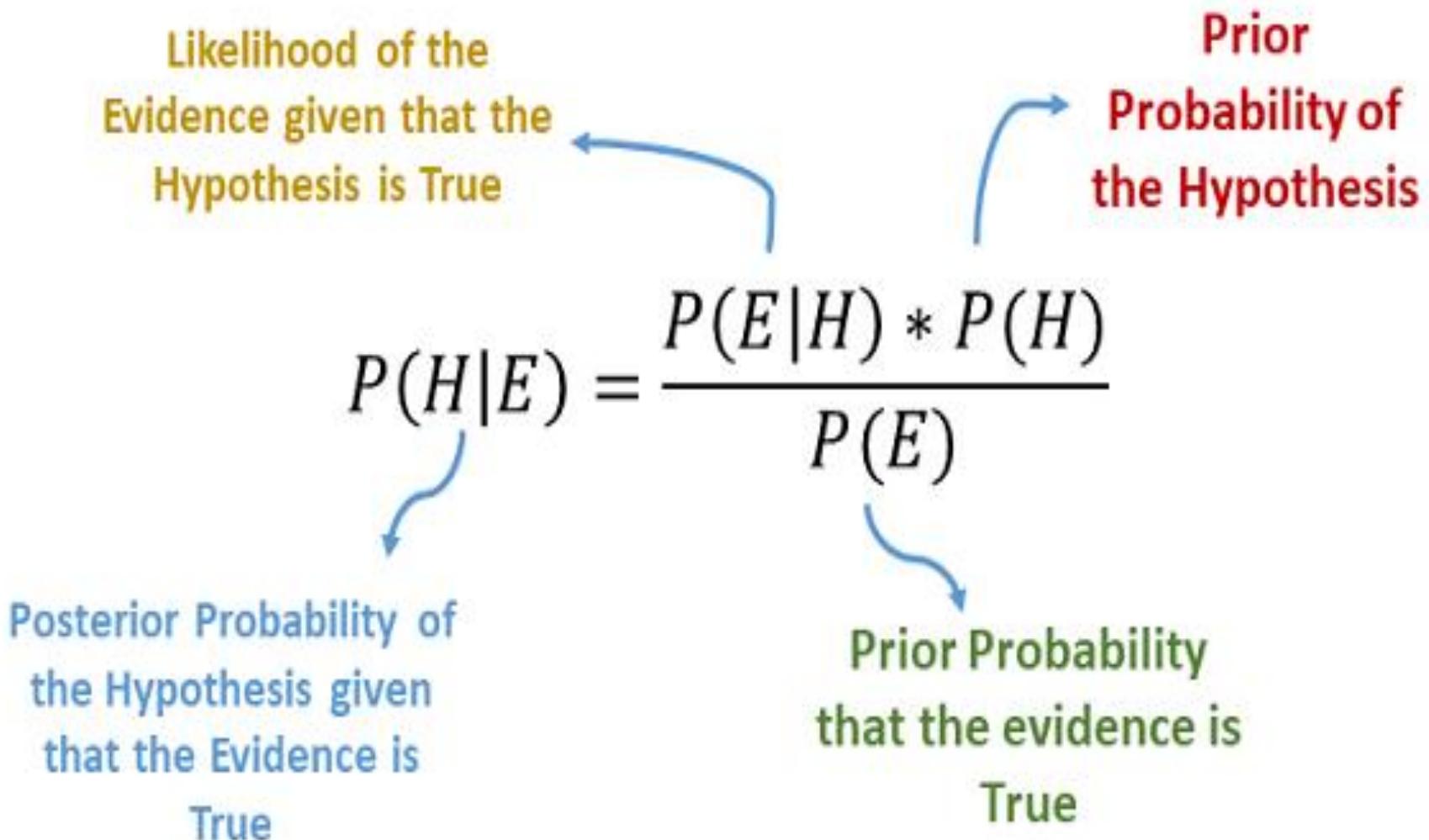
In machine learning, naive Bayes classifiers are a family of simple "probabilistic classifiers" based on applying Bayes' theorem with strong (naive) independence assumptions between the features.

$$P(A|B) = \frac{P(B|A) P(A)}{P(B)}$$

using Bayesian probability terminology, the above equation can be written as

$$\text{Posterior} = \frac{\text{prior} \times \text{likelihood}}{\text{evidence}}$$





Whether	Play
Sunny	No
Sunny	No
Overcast	Yes
Rainy	Yes
Rainy	Yes
Rainy	No
Overcast	Yes
Sunny	No
Sunny	Yes
Rainy	Yes
Sunny	Yes
Overcast	Yes
Overcast	Yes
Rainy	No



Frequency Table

Whether	No	Yes
Overcast		4
Sunny	2	3
Rainy	3	2
Total	5	9

Likelihood Table 1

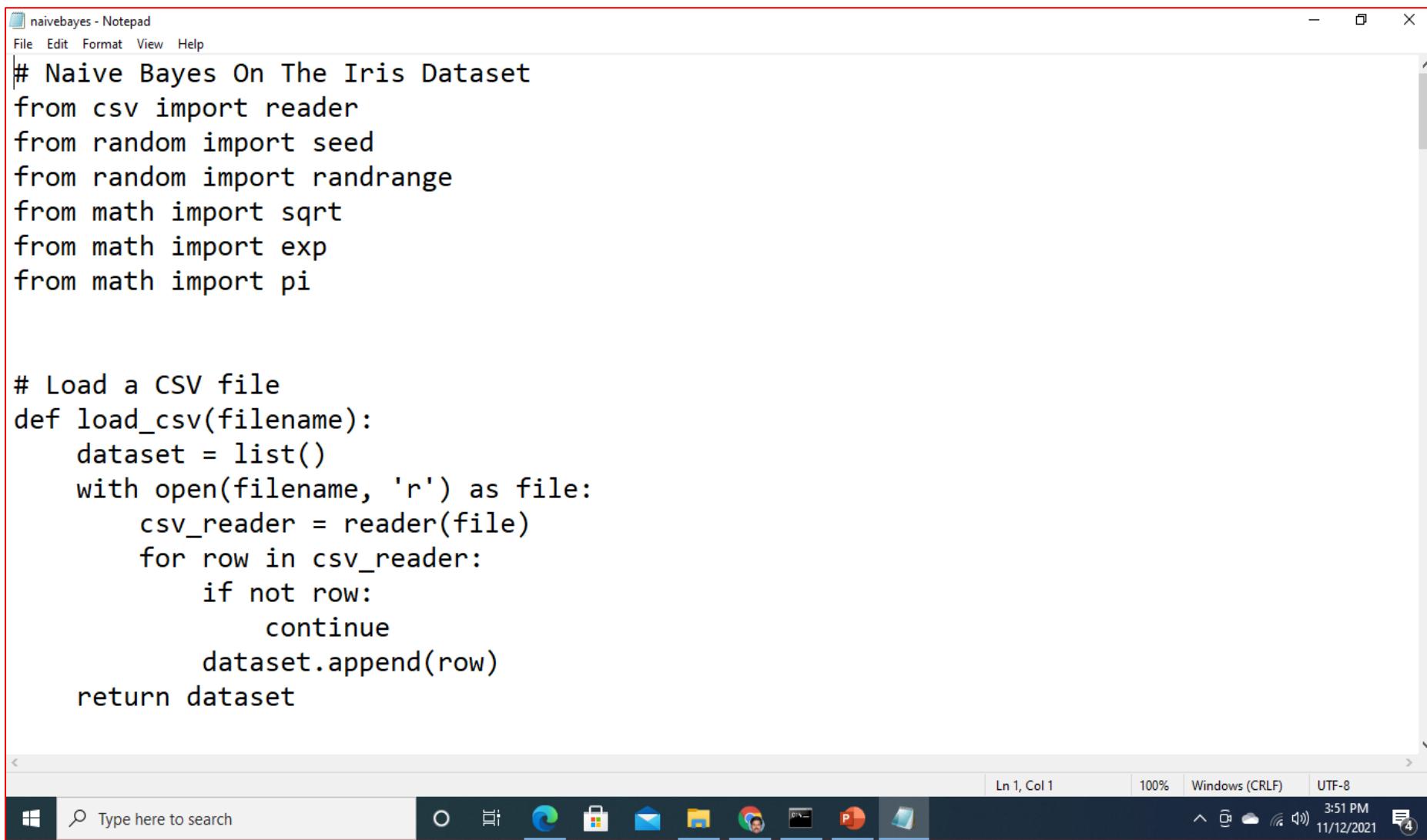
Whether	No	Yes		
Overcast		4	=4/14	0.29
Sunny	2	3	=5/14	0.36
Rainy	3	2	=5/14	0.36
Total	5	9		
	=5/14	=9/14		
	0.36	0.64		

Likelihood Table 2

Whether	No	Yes	Posterior Probability for No	Posterior Probability for Yes
Overcast		4	0/5=0	4/9=0.44
Sunny	2	3	2/5=0.4	3/9=0.33
Rainy	3	2	3/5=0.6	2/9=0.22
Total	5	9		

Fig: Sklearn Naive Bayes Classifier Python: Gaussian Naive Bayes Scikit-Learn

Naive Bayes Technique using Python



```
naivebayes - Notepad
File Edit Format View Help
# Naive Bayes On The Iris Dataset
from csv import reader
from random import seed
from random import randrange
from math import sqrt
from math import exp
from math import pi

# Load a CSV file
def load_csv(filename):
    dataset = list()
    with open(filename, 'r') as file:
        csv_reader = reader(file)
        for row in csv_reader:
            if not row:
                continue
            dataset.append(row)
    return dataset

Ln 1, Col 1 100% Windows (CRLF) UTF-8
Type here to search 3:51 PM 11/12/2021 4
```

```
C:\Users\Dr. Asadi\Downloads>python naivebayes.py
Scores: [93.3333333333333, 96.66666666666667, 100.0, 93.3333333333333, 93.3333333333333]
Mean Accuracy: 95.333%
```

```
C:\Users\Dr. Asadi\Downloads>
```

5) KNN: K Nearest Neighbor(KNN) is a very simple, easy to understand, versatile and one of the topmost machine learning algorithms.

- ✓ KNN used in the variety of applications such as finance, healthcare, political science, handwriting detection, image recognition and video recognition.
- ✓ In Credit ratings, financial institutes will predict the credit rating of customers.
- ✓ In loan disbursement, banking institutes will predict whether the loan is safe or risky.
- ✓ In political science, classifying potential voters in two classes will vote or won't vote.
- ✓ KNN algorithm used for both classification and regression problems. KNN algorithm based on feature similarity approach

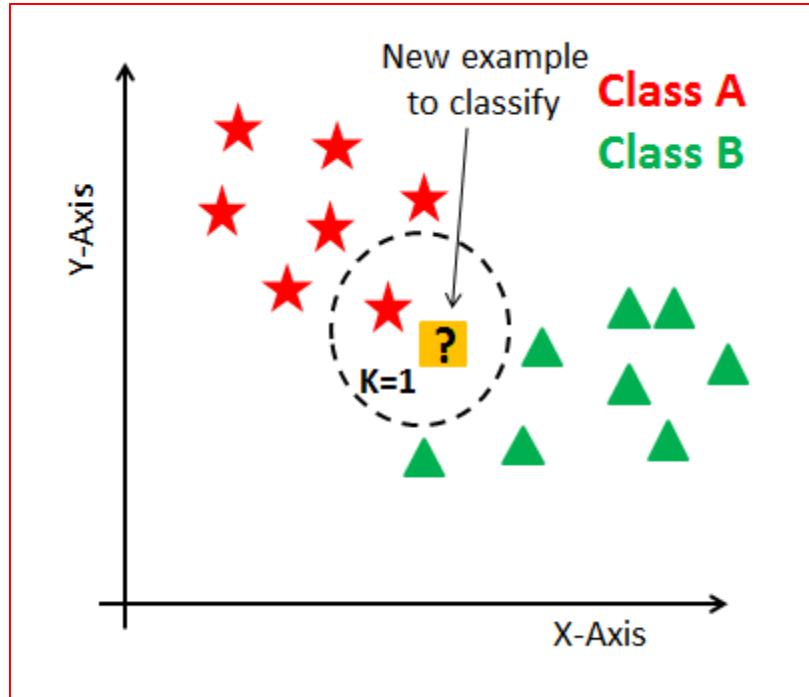


Fig: Beginning of the $k=1$ for KNN

✓ KNN has the following basic steps:

1. Start
2. Calculate distance
3. Find closest neighbors
4. Vote for labels
5. Stop

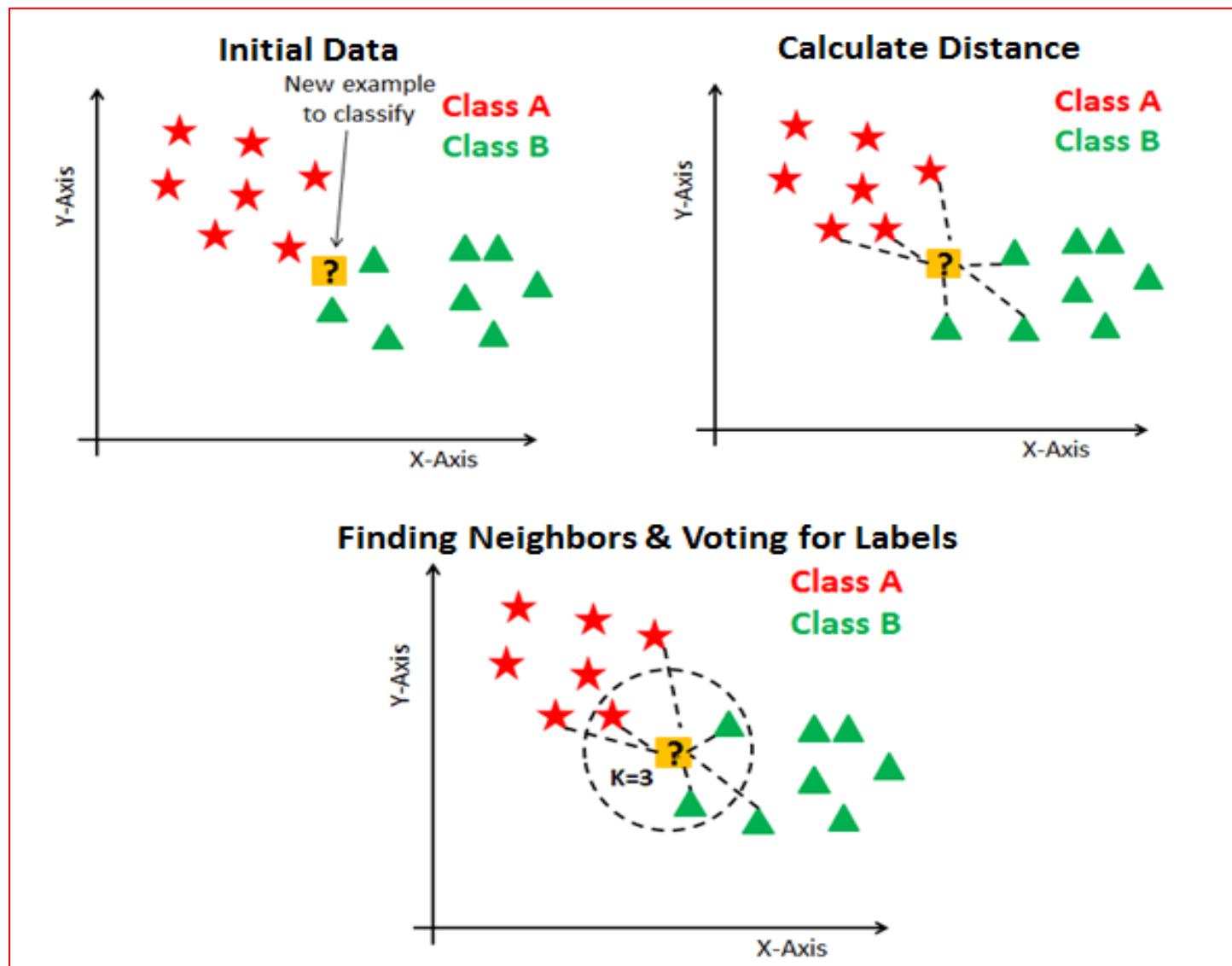


Fig: KNN Algorithm

Algorithm : Classifier Building in Scikit-learn

1. Start
2. KNN Classifier: Defining dataset
3. Encoding data columns
4. Combining Features
5. Generating Model
6. KNN with Multiple Labels
7. Loading Data
8. Exploring Data
9. Let's check records of the target set.
10. Splitting Data
11. Generating Model for $K=5$
12. Model Evaluation for $k=5$
13. Re-generating Model for $K=7$
14. Model Evaluation for $k=7$
15. Stop

KNN Technique using Python

```
knn - Notepad
File Edit Format View Help
# KNN Technique using Python
# Assigning features and label variables
# First Feature
weather=['Sunny','Sunny','Overcast','Rainy','Rainy','Rainy','Overcast','Sunny','Sunny',
'Rainy','Sunny','Overcast','Overcast','Rainy']
# Second Feature
temp=['Hot','Hot','Hot','Mild','Cool','Cool','Cool','Mild','Mild','Mild','Mild','Mild','H
|
# Label or target variable
play=['No','No','Yes','Yes','Yes','No','Yes','No','Yes','Yes','Yes','Yes','Yes','Yes','N
# Import LabelEncoder
from sklearn import preprocessing
#creating labelEncoder
le = preprocessing.LabelEncoder()
# Converting string labels into numbers.
weather_encoded=le.fit_transform(weather)
print(weather_encoded)

# converting string labels into numbers
temp_encoded=le.fit_transform(temp)
Ln 8, Col 1      100%    Windows (CRLF)    UTF-8
Type here to search  O  E  Microsoft Store  Mail  Google Photos  P  4:18 PM  11/12/2021  4
```


1. COVID-19 VIRUS DETECTION

- ✓ Coronavirus disease (COVID-19) is an infectious disease caused by a **newly discovered coronavirus**.
- ✓ COVID-19 is caused by a coronavirus called **SARS-CoV-2**. (Severe Acute Respiratory Syndrome).
- ✓ COVID-19 is a disease caused by a new strain of coronavirus. '**CO**' stands for corona, '**VI**' for virus, and '**D**' for disease. Formerly, this disease was referred to as '2019 novel coronavirus' or '**2019-nCoV**'.



National
Foundation for
Infectious
Diseases

Symptoms of COVID-19*

- Fever
- Cough
- Shortness of breath or difficulty breathing
- Chills
- Muscle pain
- Headache
- Sore throat
- New loss of taste or smell
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

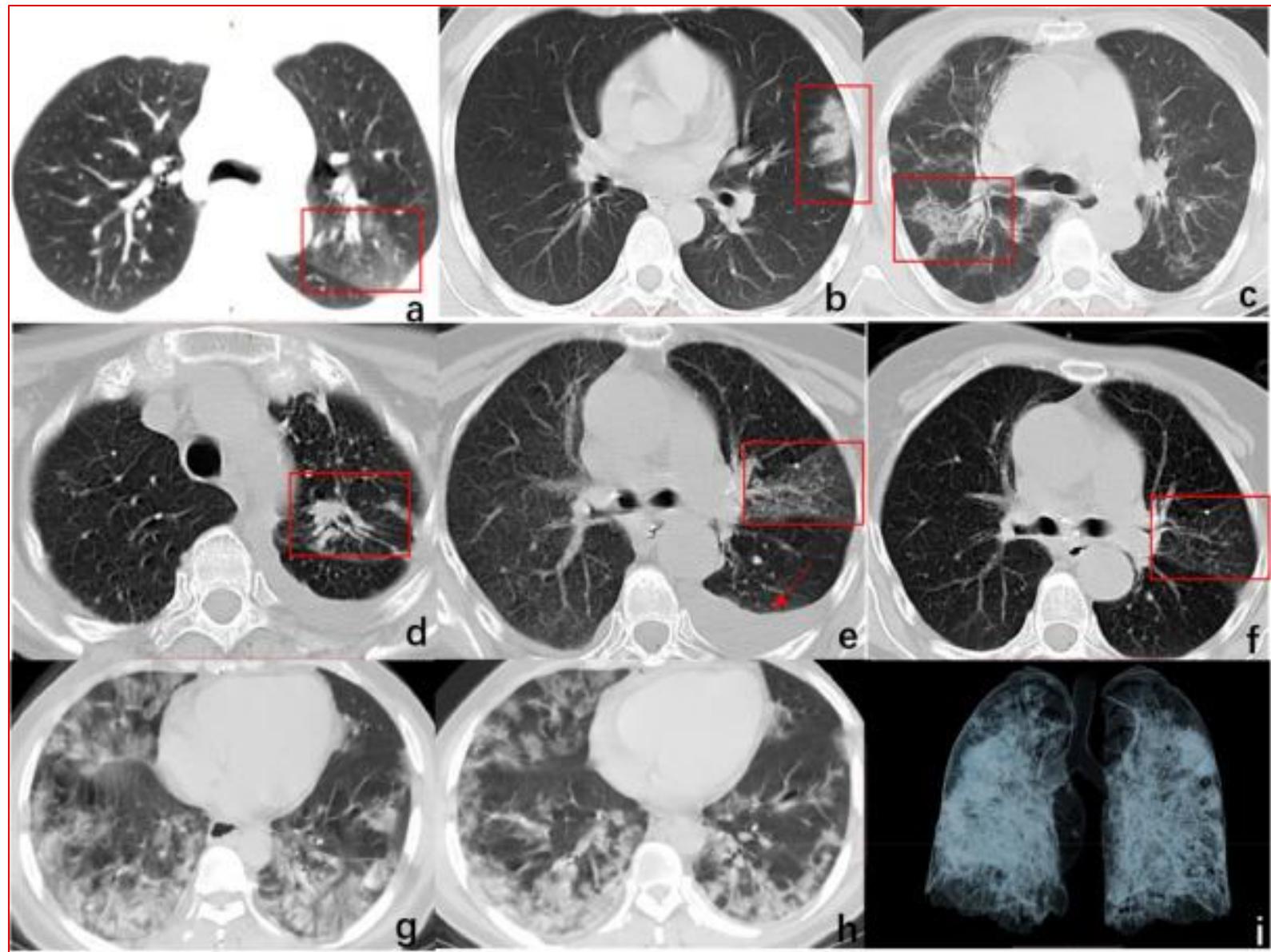


Fig: Clinical and Imaging features of COVID-19 Patients

Step 1: Convolution Operation: It refers to the combination of two functions to produce a third function.

Step 1(b): ReLU Layer: Rectified Linear Unit or ReLU. ReLU is a activation function to compute and predictable gradient back propagation of the error. It increases the Linearity functions in the context of Convolutional Neural Networks.

Step 2: Pooling: It reduces the spatial size of representation and to reduce the amount of parameters and also computation in the network. There are two types i.e. max poling and average pooling.

✓ **Step 3: Flattening:** It is converting data into 1-D array for inputting to the next layer. It will flatten the o/p of the convolutional layer to create a single long feature vector.

✓ **Step 4: Full Connection:** It is to take the results of convolutional or pooling process, and use them to classify the image into a label.

CNN Algorithm

A Convolutional Neural Networks Introduction so to speak.

Step 1: Convolution Operation

Step 1(b): ReLU Layer

Step 2: Pooling

Step 3: Flattening

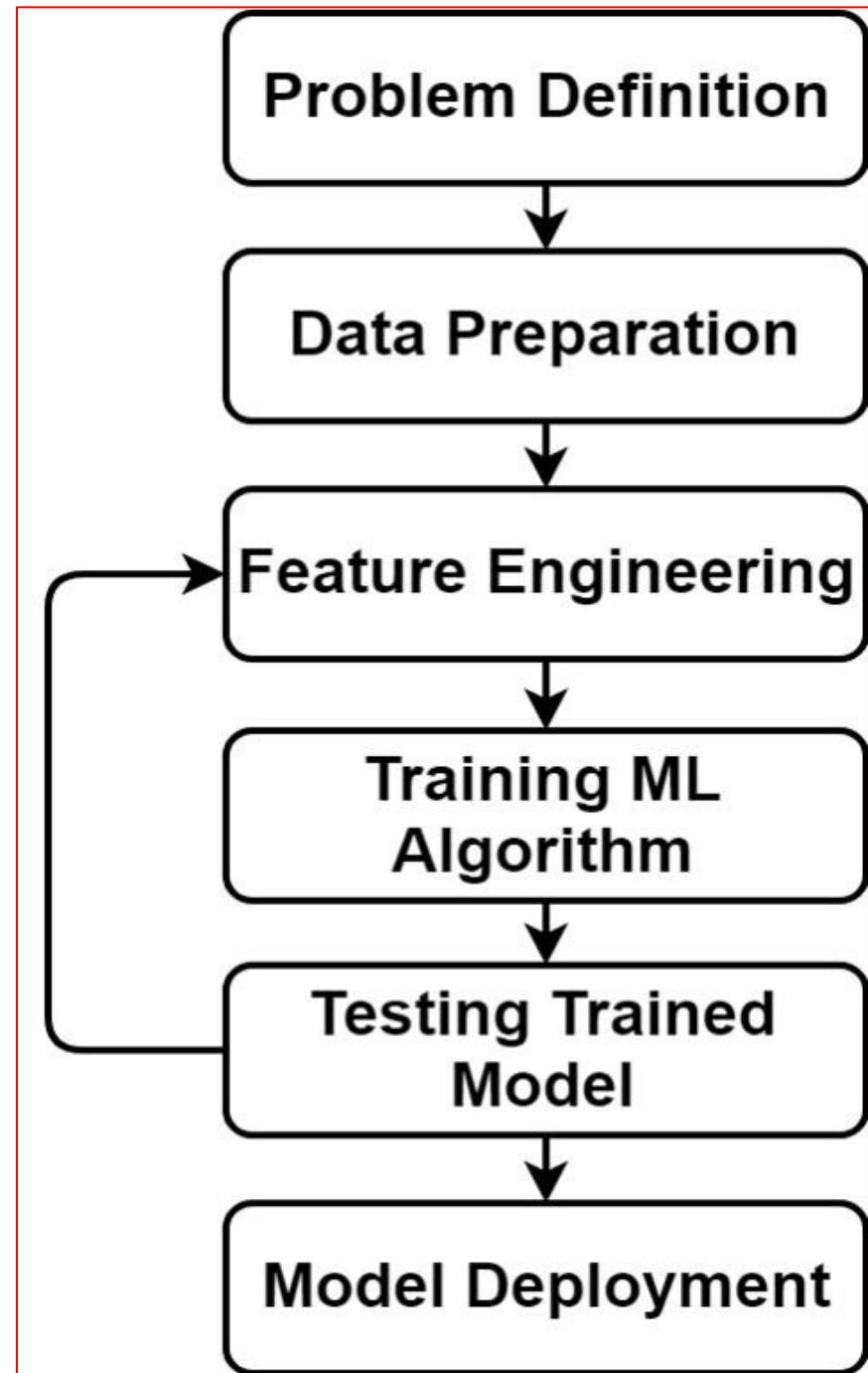
Step 4: Full Connection

Step 1 - Convolution Operation

Step 1(b): The Rectified Linear Unit (ReLU)

Step 2 - Max Pooling.

Fig: COVID-19 Image Classification using Features Extracted by Transfer Learning in Keras and TensorFlow



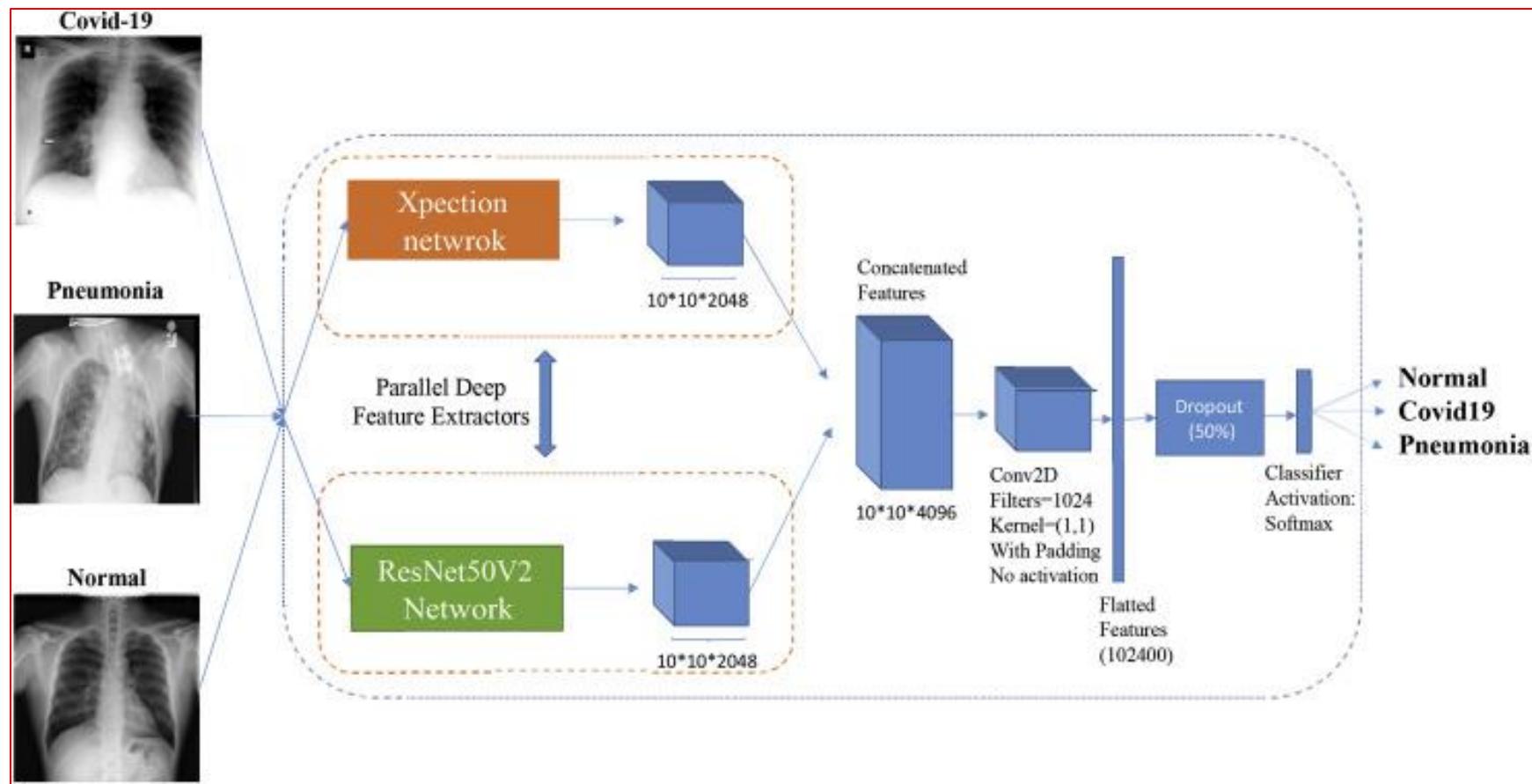
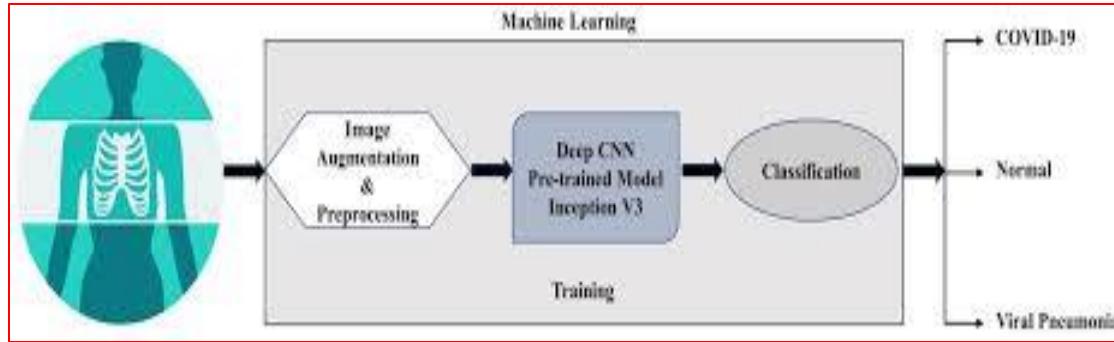




Fig: Corona Training Dataset to the CNN Model

✓ Based on the Covid-19 data set i.e. a total 960 images, our experimentation comprised of the following thirteen steps:

Step 1: Import the required libraries

Step 2: Import the training dataset

Step 3: Perform feature scaling to transform the data

Step 4: Create a data structure with 60-time steps and 1 output

Step 5: Import Keras library and its packages

Step 6: Initialize the ECNN

Step 7: Add the LSTM layers and some dropout regularization.

Step 8: Add the output layer.

Step 9: Compile the ECNN

Step 10: Fit the ECNN to the training set

Step 11: Load the COVID-19 test image data for 2020

Step 12: Get the predicted COVID-19 for 2020

Step 13: Visualize the results of predicted and real COVID-19

CNN Code

Import the Sequential model and layers

```
from keras.models import Sequential
```

```
from keras.layers import Conv2D, MaxPooling2D
```

```
from keras.layers import Activation, Dropout, Flatten, Dense
```

```
model = Sequential()
```

```
model.add(Conv2D(32, (3, 3), input_shape=(300, 300, 3)))
```

```
model.add(Activation('relu'))
```

```
model.add(MaxPooling2D(pool_size=(2, 2), padding = 'same'))
```

```
model.add(Conv2D(64, (3, 3)))
```

```
model.add(Activation('relu'))
```

```
model.add(MaxPooling2D(pool_size=(2, 2)))
```

```
model.add(Conv2D(128, (3, 3)))
```

```
model.add(Activation('relu'))
```

```
model.add(MaxPooling2D(pool_size=(2, 2)))
```

```
model.add(Flatten())
```

```
model.add(Dense(64))
```

```
model.add(Activation('relu'))
```

```
model.add(Dropout(0.5))
```

```
model.add(Dense(1))
```

```
model.add(Activation('sigmoid'))
```

```
model.compile(loss = 'binary_crossentropy',
               optimizer = 'rmsprop',
               metrics = ['accuracy'])
```

```
batch_size = 5
```

Training Augmentation configuration

```
from keras.preprocessing.image import ImageDataGenerator
```

```
train_datagen = ImageDataGenerator(rescale = 1./255,
                                   shear_range = 0.2,
                                   zoom_range = 0.2,
                                   horizontal_flip = True)
```

Testing Augmentation - Only Rescaling

```
test_datagen = ImageDataGenerator(rescale = 1./255)
```

Generates batches of Augmented Image data

```
train_generator = train_datagen.flow_from_directory('covid-train/',
target_size = (300, 300),
batch_size = batch_size,
class_mode = 'binary')
```

Generator for validation data

```
validation_generator = test_datagen.flow_from_directory('covid-test/',
target_size = (300, 300),
batch_size = batch_size,
class_mode = 'binary')

model.fit(train_generator,
epochs = 5,
validation_data = validation_generator, verbose = 1)
```

Evaluating model performance on Testing data

```
loss, accuracy = model.evaluate(validation_generator)
print('\nAccuracy: ', accuracy, '\nLoss: ', loss)
```

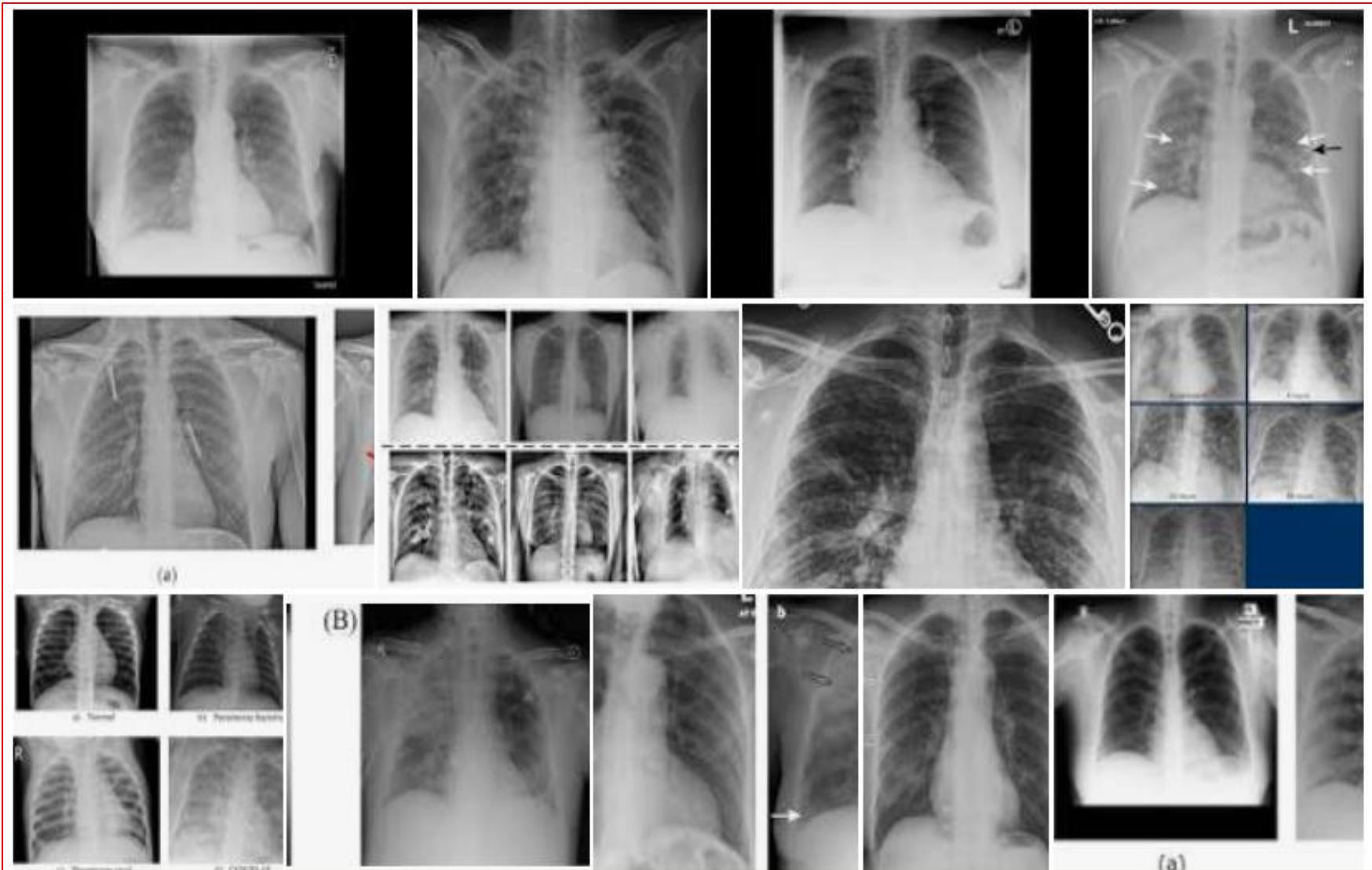
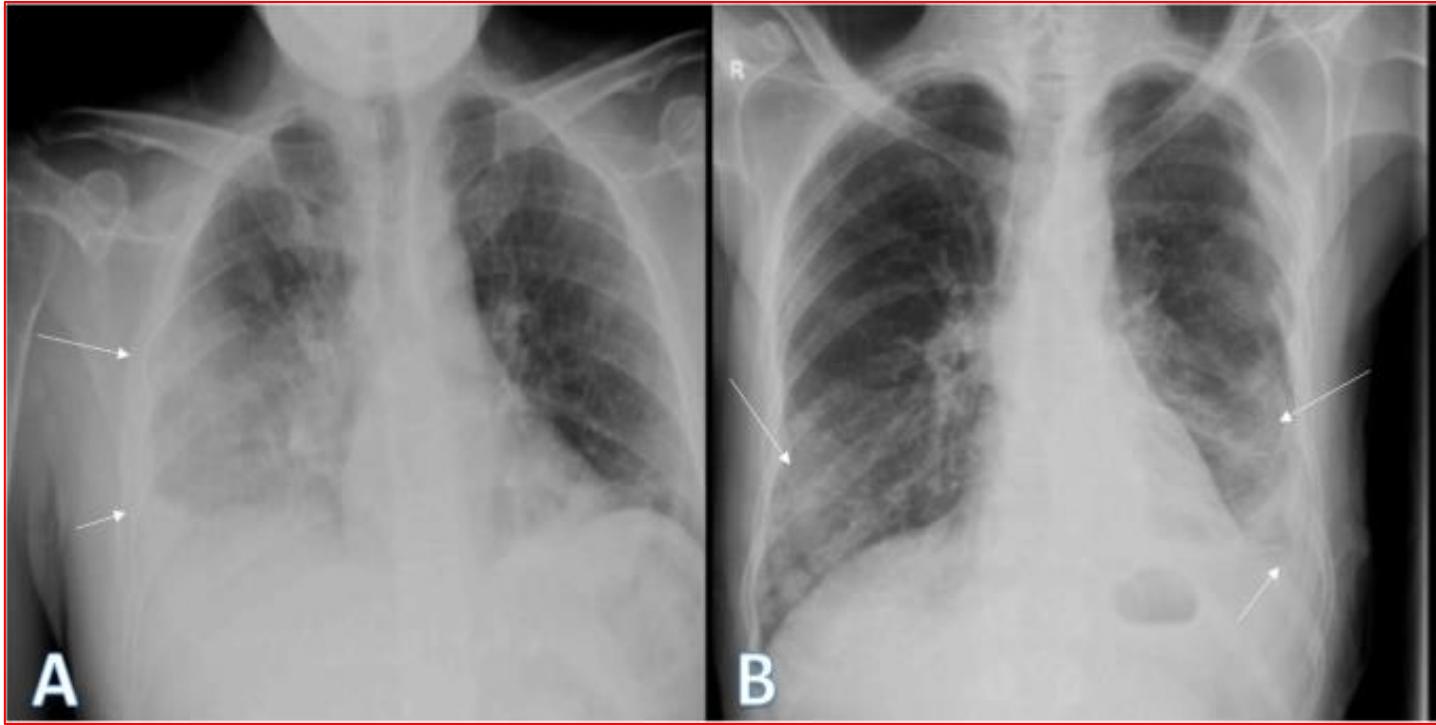


Fig: Corona Testing Dataset to the CNN Model



**Fig: Chest X-ray of COVID-19 virus
and severity**

```
tbarua1@ubuntu:~$ python3 rnn_image.py
/home/tbarua1/.local/lib/python3.6/site-packages/tensorflow/python/framework/dtypes.py:516: FutureWarning: Passing (type, 1) or 'ltype' as a synonym
of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
_np_qint8 = np.dtype([("qint8", np.int8, 1)])
Step 1, Minibatch Loss= 2.6693, Training Accuracy= 0.148
Step 200, Minibatch Loss= 2.1817, Training Accuracy= 0.281
Step 400, Minibatch Loss= 1.9373, Training Accuracy= 0.453
Step 600, Minibatch Loss= 1.8595, Training Accuracy= 0.414
Step 800, Minibatch Loss= 1.6794, Training Accuracy= 0.500
Step 1000, Minibatch Loss= 1.5005, Training Accuracy= 0.539
-----
Step 7000, Minibatch Loss= 0.5716, Training Accuracy= 0.836
Step 7200, Minibatch Loss= 0.6380, Training Accuracy= 0.805
Step 7400, Minibatch Loss= 0.6344, Training Accuracy= 0.812
Step 7600, Minibatch Loss= 0.5249, Training Accuracy= 0.828
Step 7800, Minibatch Loss= 0.5086, Training Accuracy= 0.836
Step 8000, Minibatch Loss= 0.4893, Training Accuracy= 0.828
Step 8200, Minibatch Loss= 0.5642, Training Accuracy= 0.805
Step 8400, Minibatch Loss= 0.4294, Training Accuracy= 0.852
Step 8600, Minibatch Loss= 0.5157, Training Accuracy= 0.852
Step 8800, Minibatch Loss= 0.4112, Training Accuracy= 0.867
Step 9000, Minibatch Loss= 0.4896, Training Accuracy= 0.859
Step 9200, Minibatch Loss= 0.4786, Training Accuracy= 0.859
Step 9400, Minibatch Loss= 0.4639, Training Accuracy= 0.859
Step 9600, Minibatch Loss= 0.4180, Training Accuracy= 0.852
Step 9800, Minibatch Loss= 0.4679, Training Accuracy= 0.891
Step 10000, Minibatch Loss= 0.4221, Training Accuracy= 0.875
Optimization Finished!
Testing Accuracy: 0.8671875Step 7000, Minibatch Loss= 0.5716, Training Accuracy= 0.836
```

Fig : Number Epoches with Accuracy and Loss

Activities Terminal Sun 08:16 ● tbarua1@ubuntu:~

```
tbarua1@ubuntu:~$ python covi2.py
Traceback (most recent call last):
  File "covi2.py", line 1, in <module>
    from PIL import Image
ImportError: No module named PIL
tbarua1@ubuntu:~$ python3 covi2.py
tbarua1@ubuntu:~$ python3 covid.py
2021-01-03 08:15:29.532120: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'libcudart.so.11.0'
; dlerror: libcudart.so.11.0: cannot open shared object file: No such file or directory
2021-01-03 08:15:29.532186: I tensorflow/stream_executor/cuda/cudart_stub.cc:29] Ignore above cudart dlerror if you do not have a GPU set up on your machine.
2021-01-03 08:15:34.647755: I tensorflow/compiler/jit/xla_cpu_device.cc:41] Not creating XLA devices, tf_xla_enable_xla_devices not set
2021-01-03 08:15:34.649432: I tensorflow/stream_executor/platform/default/dso_loader.cc:49] Successfully opened dynamic library libcuda.so.1
2021-01-03 08:15:34.728098: E tensorflow/stream_executor/cuda/cuda_driver.cc:328] failed call to cuInit: CUDA_ERROR_NO_DEVICE: no CUDA-capable device is detected
2021-01-03 08:15:34.728179: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:156] kernel driver does not appear to be running on this host (ubuntu): /proc/driver/nvidia/version does not exist
2021-01-03 08:15:34.729063: I tensorflow/compiler/jit/xla_gpu_device.cc:99] Not creating XLA devices, tf_xla_enable_xla_devices not set
Found 13 images belonging to 2 classes.
Found 6 images belonging to 2 classes.
2021-01-03 08:15:35.930750: I tensorflow/compiler/mlir/mlir_graph_optimization_pass.cc:116] None of the MLIR optimization passes are enabled (registered 2)
2021-01-03 08:15:35.931657: I tensorflow/core/platform/profile_utils/cpu_utils.cc:112] CPU Frequency: 2194925000 Hz
Epoch 1/5
3/3 [=====] - 6s 1s/step - loss: 10.6792 - accuracy: 0.5058 - val_loss: 1.3087 - val_accuracy: 0.5000
Epoch 2/5
3/3 [=====] - 3s 1s/step - loss: 1.3489 - accuracy: 0.3694 - val_loss: 0.6944 - val_accuracy: 0.5000
Epoch 3/5
3/3 [=====] - 3s 1s/step - loss: 0.6939 - accuracy: 0.4391 - val_loss: 0.7699 - val_accuracy: 0.5000
Epoch 4/5
3/3 [=====] - 3s 936ms/step - loss: 0.7405 - accuracy: 0.3548 - val_loss: 0.6836 - val_accuracy: 0.6667
Epoch 5/5
3/3 [=====] - 4s 969ms/step - loss: 0.7814 - accuracy: 0.5058 - val_loss: 0.6822 - val_accuracy: 0.6667
2/2 [=====] - 0s 38ms/step - loss: 0.6822 - accuracy: 0.6667

Accuracy: 0.6666666865348816
Loss: 0.682172954082489
tbarua1@ubuntu:~$
```

Fig : Execution flow of Covid-19 Dataset

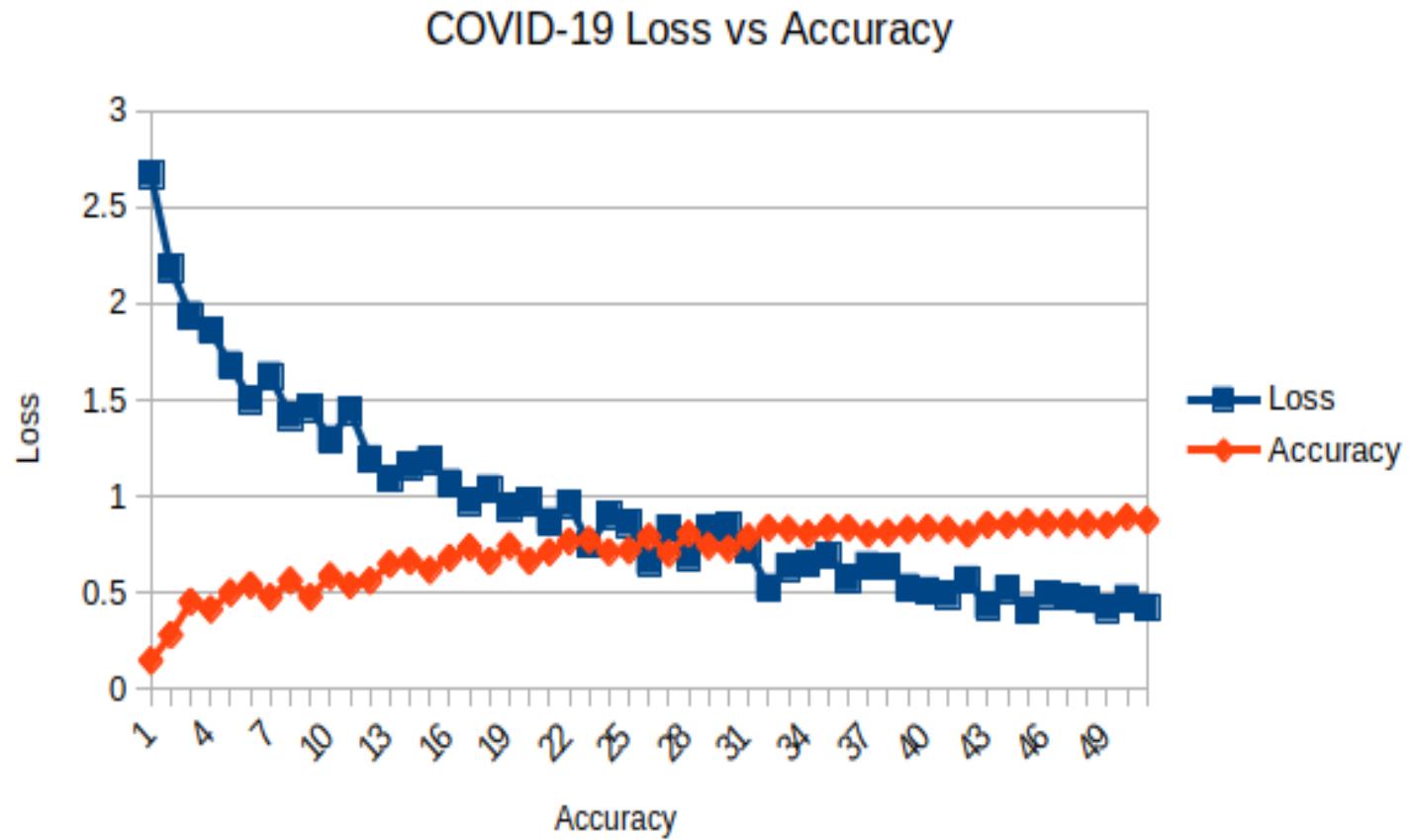


Fig : Data Loss vs Accuracy



Fig : Execution time between COVID-19 virus dataset vs. Number Processors

COVID-19 Data Size vs Accuracy

Accuracy: 0.6666666865348816 Loss: 0.682172954082489

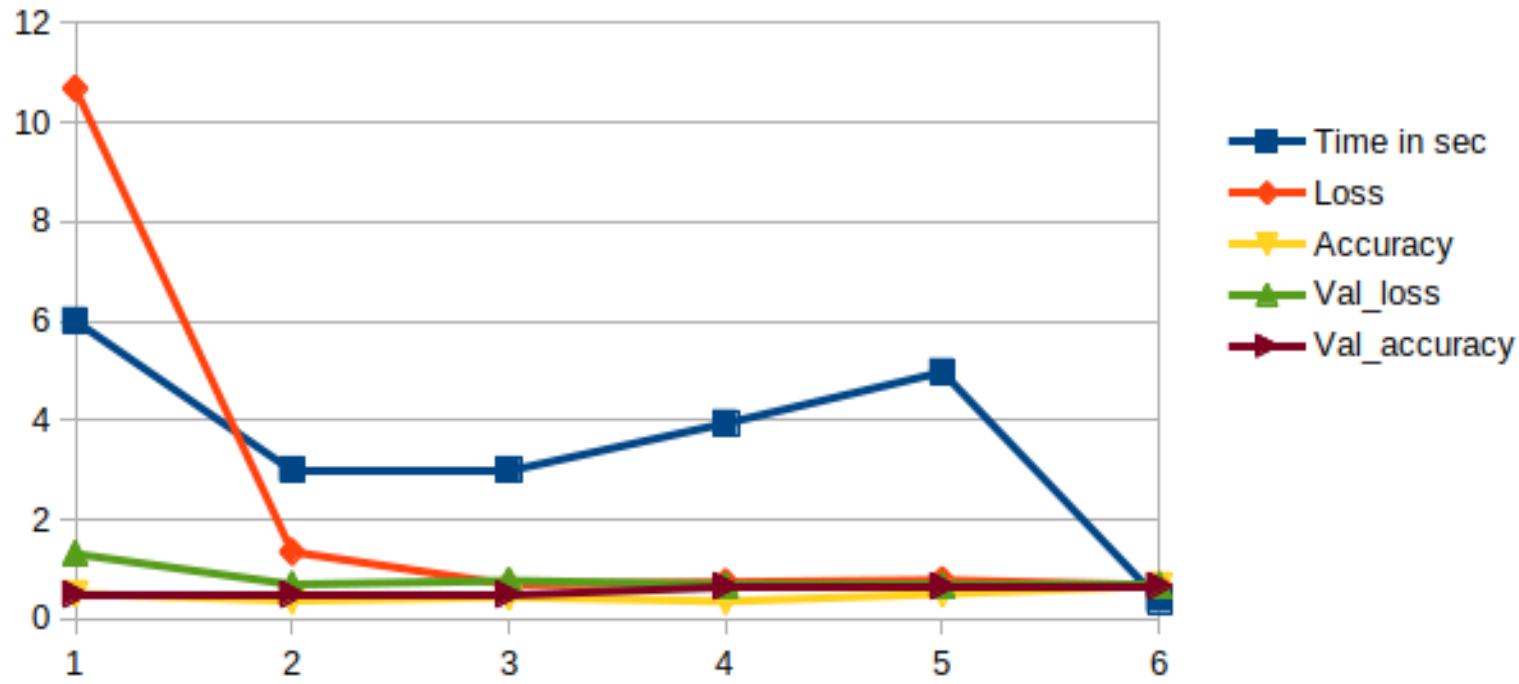


Fig : Covid-19 Data Size vs. Accuracy

2. COVID-19 STRAIN VIRUS DETECTION

- ✓ COVID-19 affects different people in different ways, infected people have had a wide range of symptoms reported - from mild symptoms to severe illness.
- ✓ Look for emergency warning signs for COVID-19, if someone is showing any of these signs, seek emergency medical care immediately:
 - ✓ Trouble breathing
 - ✓ Persistent pain or pressure in the chest
 - ✓ New confusion
 - ✓ Inability to wake or stay awake
 - ✓ Bluish lips or face

✓ Symptoms may appear 2-14 days after exposure to the virus. People with these symptoms may have COVID-19:

- ✓ Fever or chills
- ✓ Cough
- ✓ Shortness of breath or difficulty breathing
- ✓ Fatigue
- ✓ Muscle or body aches
- ✓ Headache
- ✓ New loss of taste or smell
- ✓ Sore throat
- ✓ Congestion or runny nose
- ✓ Nausea or vomiting
- ✓ Diarrhea

NEW STRAINS

SEVEN new symptoms

Aches and pains



Conjunctivitis



Sore throat



A rash on the skin



Diarrhoea



Headache



Discolouration of fingers or toes



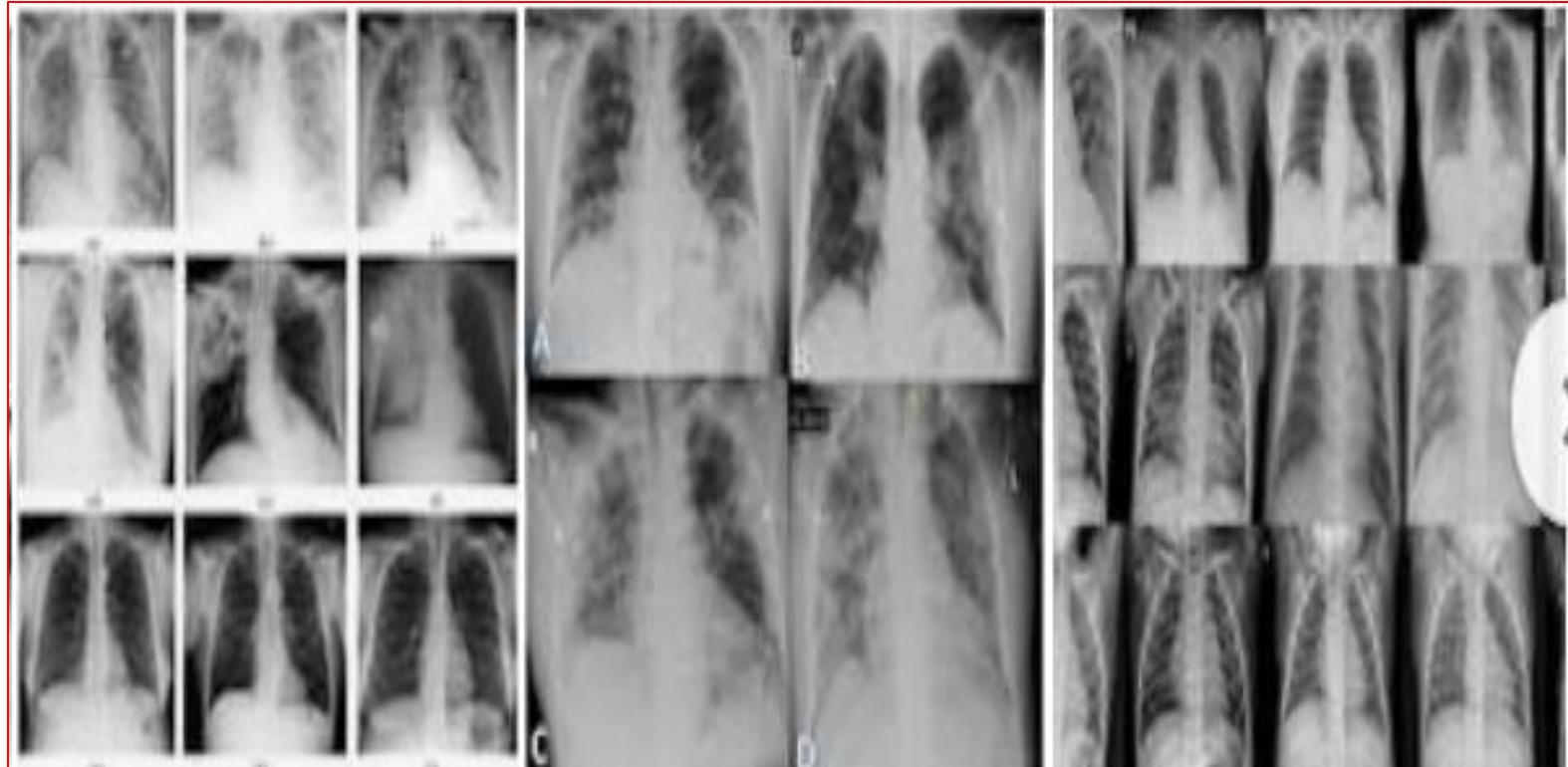


Fig: Covid-19 strain Input Dataset to the CNN Model

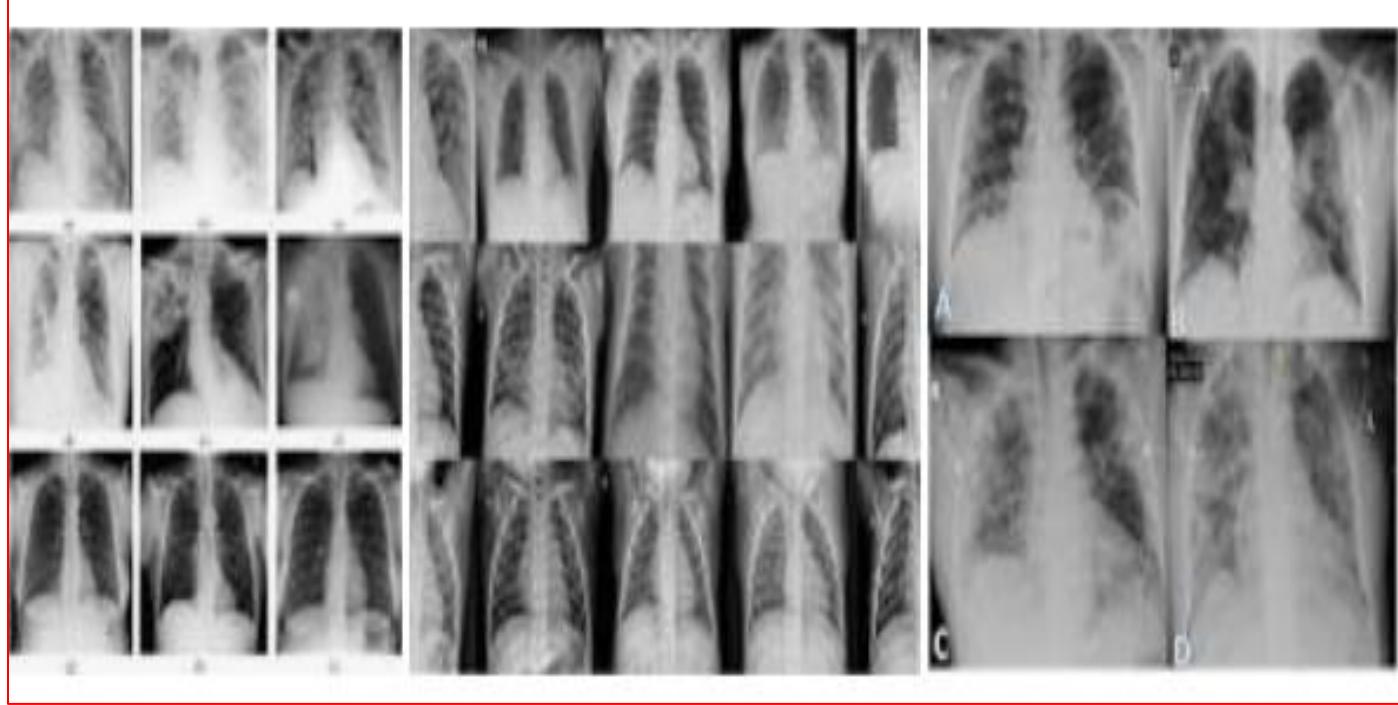


Fig: Covid-19 Strain Training Dataset to the CNN Model

✓ **COVID data set using RNN:** "Recurrent Neural Network: A Recurrent Neural Network (LSTM) implementation example using TensorFlow library.

```
From_fUTURE_import print_function
```

```
import tensorflow as tf  
from tensorflow.contrib import rnn
```

Import Covid-19 data

```
from tensorflow.examples.tutorials.mnist import input_data  
mnist = input_data.read_data_sets("covid_dataset/", one_hot=True)
```

"To classify images using a recurrent neural network, we consider every image row as a sequence of pixels. Because Covid-19 image shape is 28*28px, we will then handle 28 sequences of 28 steps for every sample."

Training Parameters

```
learning_rate = 0.001  
training_steps = 10000  
batch_size = 128  
display_step = 200
```

Network Parameters

```
num_input = 28 # Covid-19 data input (img shape: 28*28)  
timesteps = 28 # timesteps  
num_hidden = 128 # hidden layer num of features  
num_classes = 10 # Covid-19 total classes (0-9 digits)
```

tf Graph input

```
X = tf.placeholder("float", [None, timesteps, num_input])  
Y = tf.placeholder("float", [None, num_classes])
```

Define weights

```
weights = {  
    'out': tf.Variable(tf.random_normal([num_hidden, num_classes]))}
```

```
biases = {  
    'out': tf.Variable(tf.random_normal([num_classes]))}
```

```
def RNN(x, weights, biases):
```

Prepare data shape to match `rnn` function requirements

Current data input shape: (batch_size, timesteps, n_input)

Required shape: 'timesteps' tensors list of shape (batch_size, n_input)

Unstack to get a list of 'timesteps' tensors of shape (batch_size, n_input)

```
x = tf.unstack(x, timesteps, 1)
```

Define a lstm cell with tensorflow

```
lstm_cell = rnn.BasicLSTMCell(num_hidden, forget_bias=1.0)
```

Get lstm cell output

```
outputs, states = rnn.static_rnn(lstm_cell, x, dtype=tf.float32)
```

Linear activation, using rnn inner loop last output

```
return tf.matmul(outputs[-1], weights['out']) + biases['out']
```

```
logits = RNN(X, weights, biases)
```

```
prediction = tf.nn.softmax(logits)
```

Define loss and optimizer

```
loss_op = tf.reduce_mean(tf.nn.softmax_cross_entropy_with_logits(  
    logits=logits, labels=Y))
```

```
optimizer = tf.train.GradientDescentOptimizer(learning_rate=learning_rate)
```

```
train_op = optimizer.minimize(loss_op)
```

Evaluate model (with test logits, for dropout to be disabled)

```
correct_pred = tf.equal(tf.argmax(prediction, 1), tf.argmax(Y, 1))
```

```
accuracy = tf.reduce_mean(tf.cast(correct_pred, tf.float32))
```

Initialize the variables (i.e. assign their default value)

```
init = tf.global_variables_initializer()
```

Start training

```
with tf.Session() as sess:
```

Run the initializer

```
sess.run(init)
```

```
for step in range(1, training_steps+1):
    batch_x, batch_y = mnist.train.next_batch(batch_size)
```

Reshape data to get 28 seq of 28 elements

```
batch_x = batch_x.reshape((batch_size, timesteps, num_input))
```

Run optimization op (backprop)

```
sess.run(train_op, feed_dict={X: batch_x, Y: batch_y})
```

```
if step % display_step == 0 or step == 1:
```

Calculate batch loss and accuracy

```
loss, acc = sess.run([loss_op, accuracy], feed_dict={X: batch_x, Y: batch_y})
```

```
print("Step " + str(step) + ", Minibatch Loss= " + \
      "{:.4f}".format(loss) + ", Training Accuracy= " + \
      "{:.3f}".format(acc))
```

```
print("Optimization Finished!")
```

Calculate accuracy for 128 mnist test images

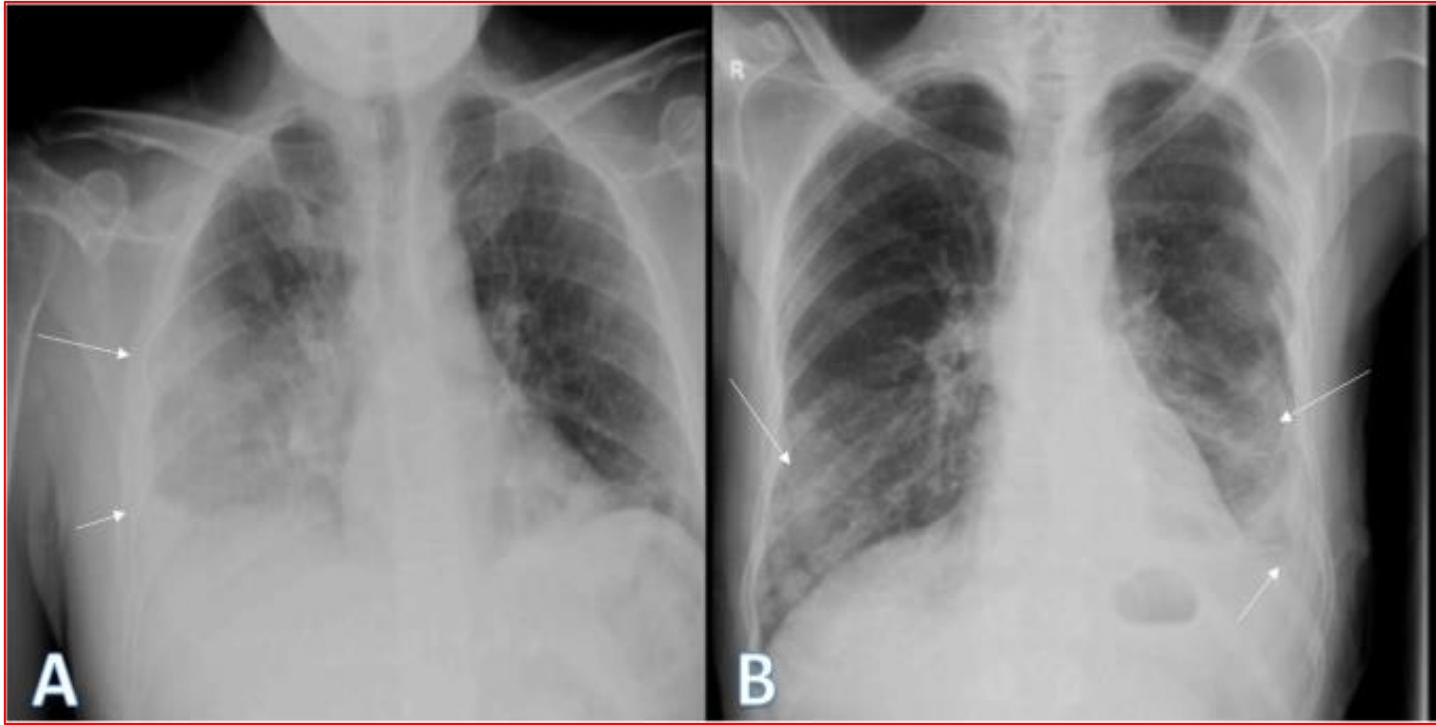
```
test_len = 128
```

```
test_data = mnist.test.images[:test_len].reshape((-1, timesteps, num_input))
```

```
test_label = mnist.test.labels[:test_len]
```

```
print("Testing Accuracy:", \
```

```
      sess.run(accuracy, feed_dict={X: test_data, Y: test_label}))
```



**Fig: Chest X-ray of COVID-19 strain
virus and severity**

3. PROSTATE CANCER DETECTION

- ✓ **Prostate cancer** is marked by an uncontrolled (malignant) growth of cells in the **prostate** gland.
- ✓ The **prostate** is the walnut-sized gland in men, located just below the bladder and in front of the rectum, surrounding the urethra – the tube that carries urine out of the bladder.
- ✓ 5 Warning signs are **bone pain**, compression of the spine, Painful urination, **erectile dysfunction**, and **blood in the urine**.
- ✓ Prostate cancer affects the prostate glands of men.
- ✓ **Prostate cancer** begins when cells in the **prostate** develop changes in their DNA.

- ✓ There are usually no signs or symptoms in the early stages.
- ✓ Symptoms of lung cancer develop as the condition progresses.
- ✓ The main symptoms of lung cancer include:
 - ✓ A cough that doesn't go away after 2 or 3 weeks
 - ✓ A long-standing cough that gets worse
 - ✓ Chest infections that keep coming back
 - ✓ Coughing up blood
 - ✓ An ache or pain when breathing or coughing
 - ✓ Persistent breathlessness
 - ✓ Persistent tiredness or lack of energy
 - ✓ Loss of appetite or unexplained weight loss



Fig: Prostate Cancer Input Dataset to the CNN Model

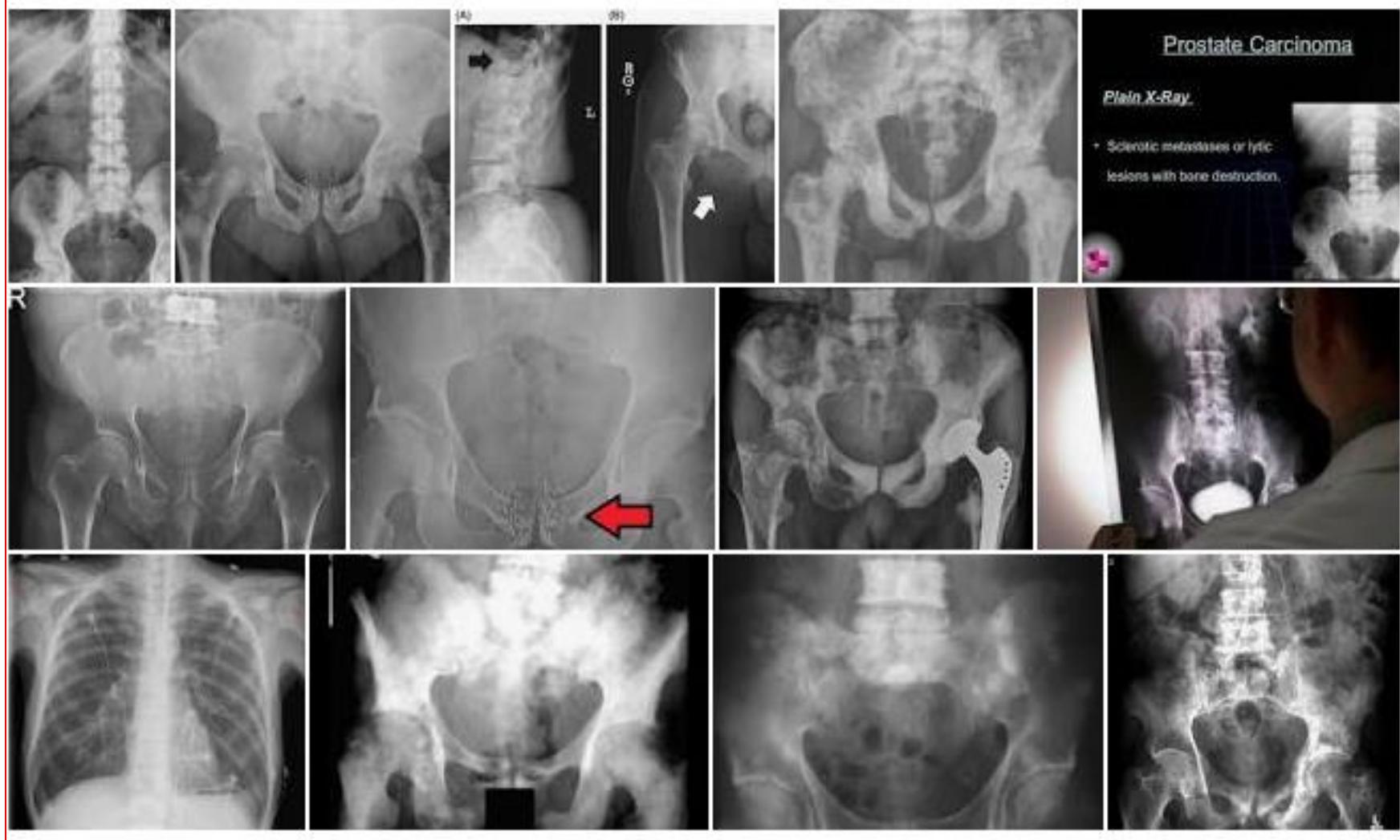


Fig: Prostate Cancer Training Dataset to the CNN Model

Magnetic Resonance Imaging (T2-WI)



Normal prostate

Peripheral zone high signal intensity
Transition zone multinodular hypointense



Prostate cancer

Area of low signal intensity
>70% in the peripheral zone

**Fig: X-ray of Prostate Cancer vs.
Normal Image**

4. BREAST CANCER DETECTION

- ✓ Breast cancer is cancer that forms in the cells of the breasts, after skin cancer, breast cancer is the most common cancer diagnosed in women in the United States.
- ✓ Breast cancer can occur in both men and women, but it's far more common in women.
- ✓ Types of breast cancer include ductal carcinoma in situ, invasive ductal carcinoma, inflammatory breast cancer, and metastatic breast cancer.

✓ Different people have different symptoms of breast cancer, some people do not have any signs or symptoms at all.

✓ Some warning signs of breast cancer are

1. New lump in the breast or underarm (armpit).
2. Thickening or swelling of part of the breast.
3. Irritation or dimpling of breast skin.
4. Redness or flaky skin in the nipple area or the breast.
5. Pulling in of the nipple or pain in the nipple area.
6. Nipple discharge other than breast milk, including blood.
7. Any change in the size or the shape of the breast.
8. Pain in any area of the breast.

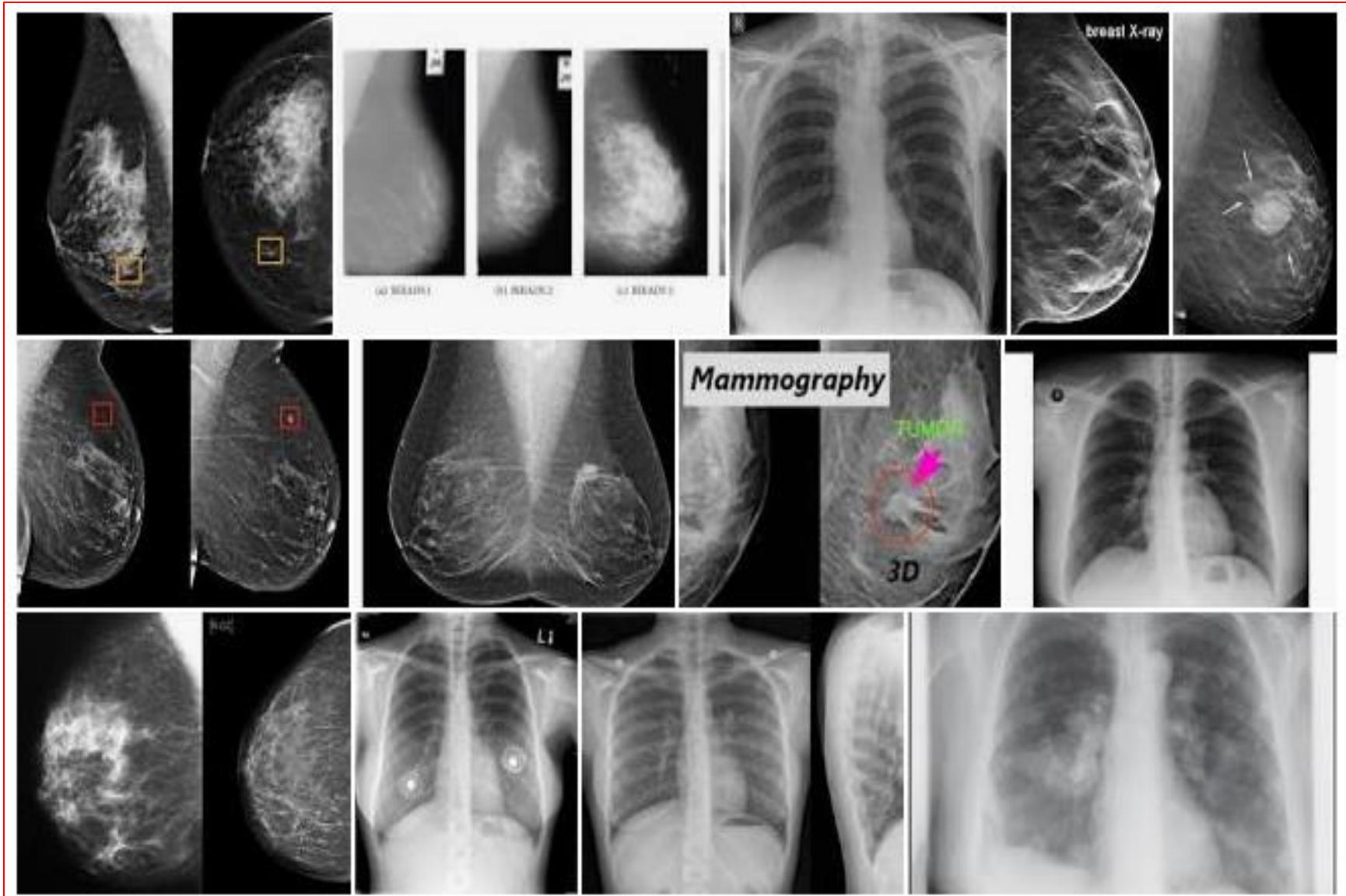


Fig: Breast Cancer Input Dataset to the CNN Model

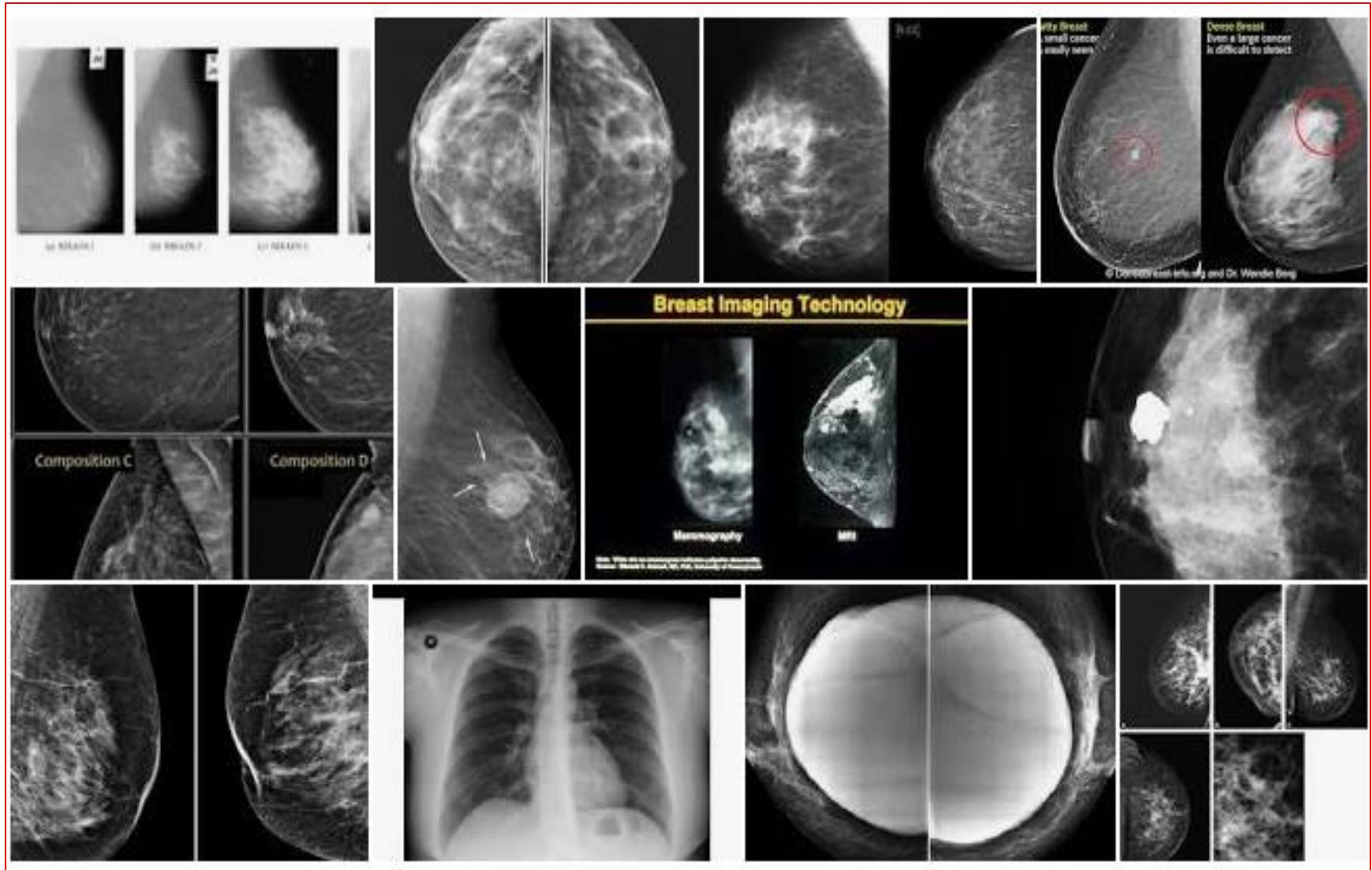
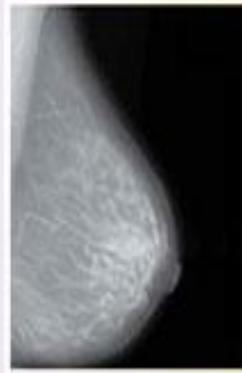


Fig: Breast Cancer Training Dataset to the CNN Model



Normal
mammogram



Benign cyst
(not cancer)



Breast
calcifications



Breast
cancer

**Fig: X-ray of Breast Cancer vs.
Normal Image**

5. LUNG CANCER DETECTION

- ✓ Lung cancer, also known as lung carcinoma, is a malignant lung tumor characterized by uncontrolled cell growth in tissues of the lung.
- ✓ This growth can spread beyond the lung by the process of metastasis into nearby tissue or other parts of the body.
- ✓ A new cough that is persistent or worsens, or a change in an existing chronic cough. Cough that produces blood. Pain in the chest, back or shoulders that worsens during coughing, laughing or deep breathing. Shortness of breath that comes on suddenly and occurs during everyday

- ✓ There are usually no signs or symptoms in the early stages.
- ✓ Symptoms of lung cancer develop as the condition progresses.
- ✓ The main symptoms of lung cancer include:
 1. A cough that doesn't go away after 2 or 3 weeks
 2. A long-standing cough that gets worse
 3. Chest infections that keep coming back
 4. Coughing up blood
 5. An ache or pain when breathing or coughing
 6. Persistent breathlessness
 7. Persistent tiredness or lack of energy
 8. Loss of appetite or unexplained weight loss

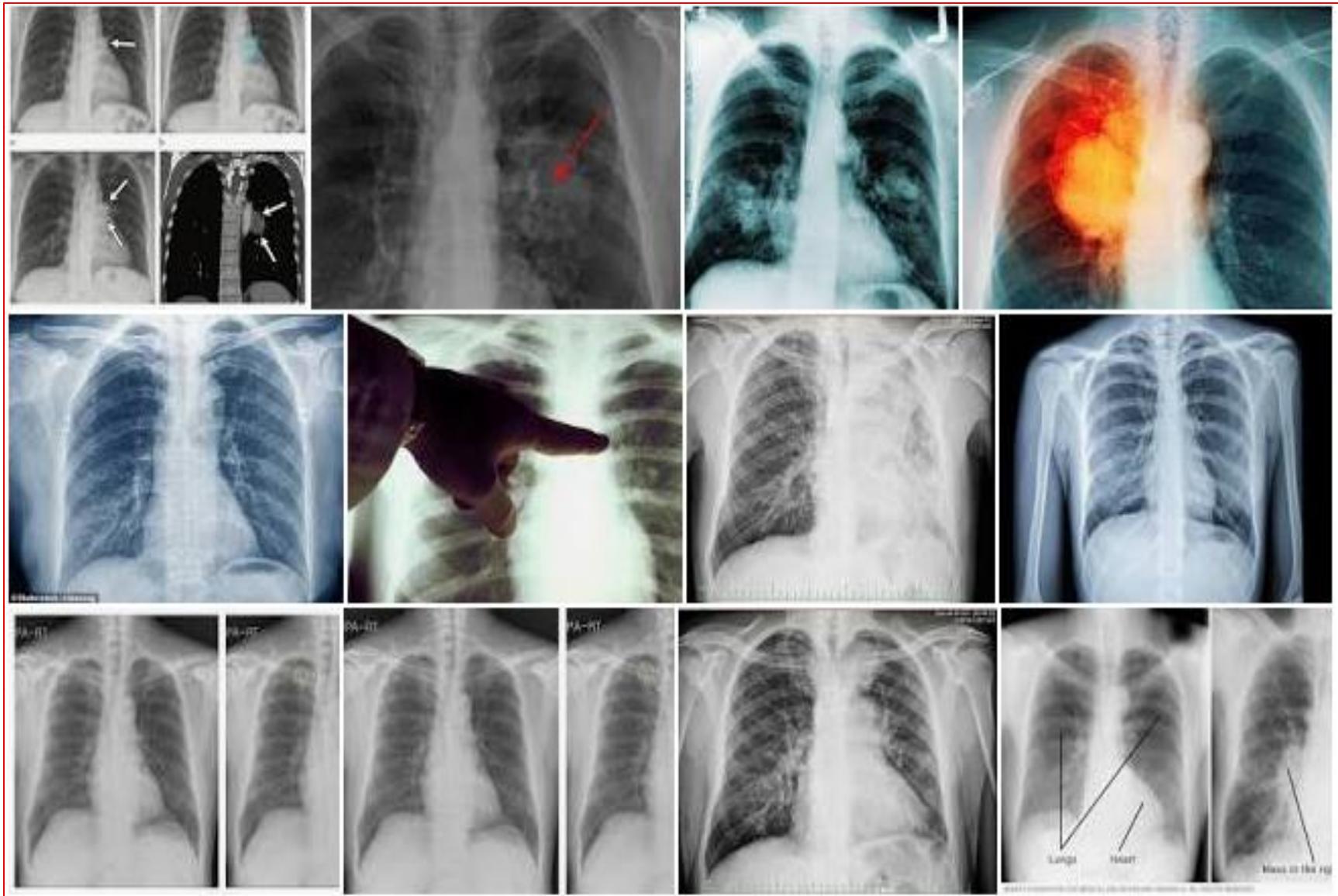


Fig: Lung Cancer Input Dataset to the CNN Model

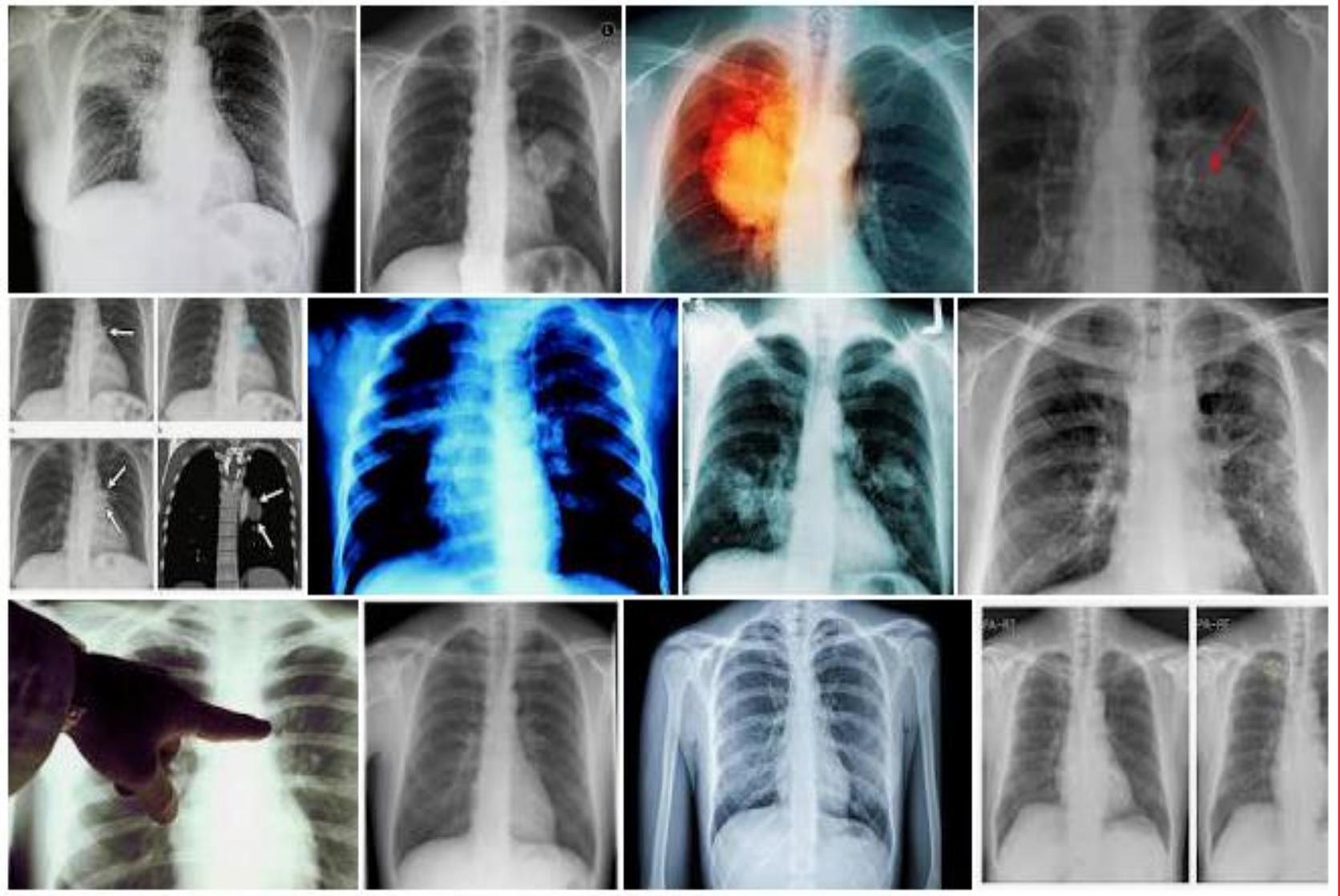


Fig: Lung Cancer Training Dataset to the CNN Model 399



Fig: X-ray of Lung Cancer vs. Normal Image

6. EBOLA VIRUS DETECTION

- ✓ **Ebola Virus Disease (EVD)** is a rare and deadly disease most commonly affecting people and **nonhuman primates (monkeys, gorillas, and chimpanzees)**.
- ✓ **Ebola virus disease (EVD)** is a deadly **disease** with occasional outbreaks that occur primarily on the African continent. EVD most commonly affects people and nonhuman primates (such as monkeys, gorillas, and chimpanzees).
- ✓ Ebola, also known as Ebola virus disease (EVD) or **Ebola hemorrhagic fever (EHF)**, is a viral hemorrhagic **fever** of humans and other primates caused by ebolaviruses.

- ✓ Symptoms may appear anywhere from 2 to 21 days after contact with the virus, with an average of 8 to 10 days.
 - ✓ The course of the illness typically progresses from “dry” symptoms initially (such as fever, aches and pains, and fatigue), and then progresses to “wet” symptoms (such as diarrhea and vomiting) as the person becomes sicker.
- ✓ Primary signs and symptoms of Ebola often include some or several of the following:
1. Fever
 2. Aches and pains, such as severe headache, muscle and joint pain, and abdominal (stomach) pain
 3. Weakness and fatigue
 4. Gastrointestinal symptoms including diarrhea and vomiting
 5. Abdominal (stomach) pain
 6. Unexplained hemorrhaging, bleeding or bruising



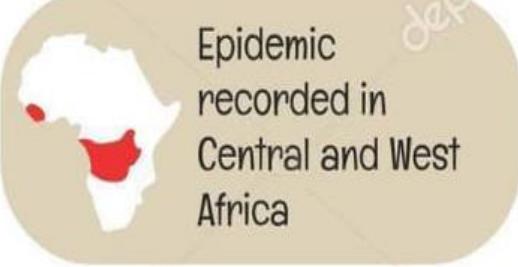
90%
of infected people
die

EBOLA



natural
peddler -
BATS

- ✗ no vaccine
- ✗ no medicine



Epidemic
recorded in
Central and West
Africa

Lorem ipsum dolor sit amet, consectetuer
adipiscing elit, sed diam nonummy nibh
euismod tincidunt ut laoreet dolore magna
aliquam erat volutpat.



Symptoms



headache



heat



abdominal pain



sore throat
and redness



rash



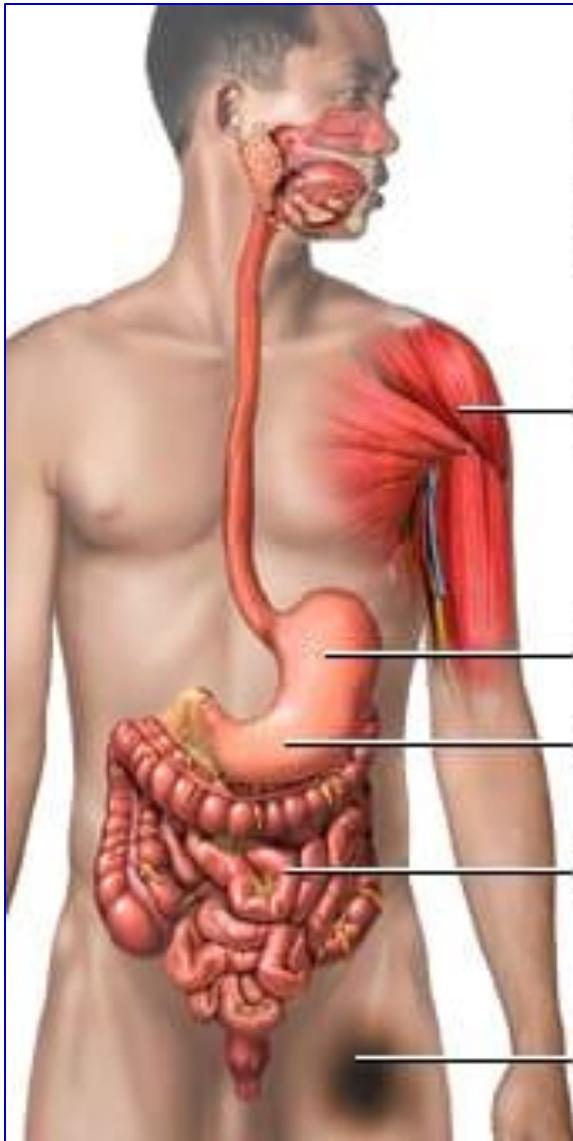
loss of appetite



vomiting blood
diarrhea blood



bleeding from
the eyes, ears, nose



Symptoms of ebola include:

Fever (greater than 101.5°F or 38.6°C)



Muscle pain and weakness

Ebola virus

Vomiting

Abdominal (stomach) pain

Diarrhea

Unexplained hemorrhage
(bleeding or bruising)

 ADAM

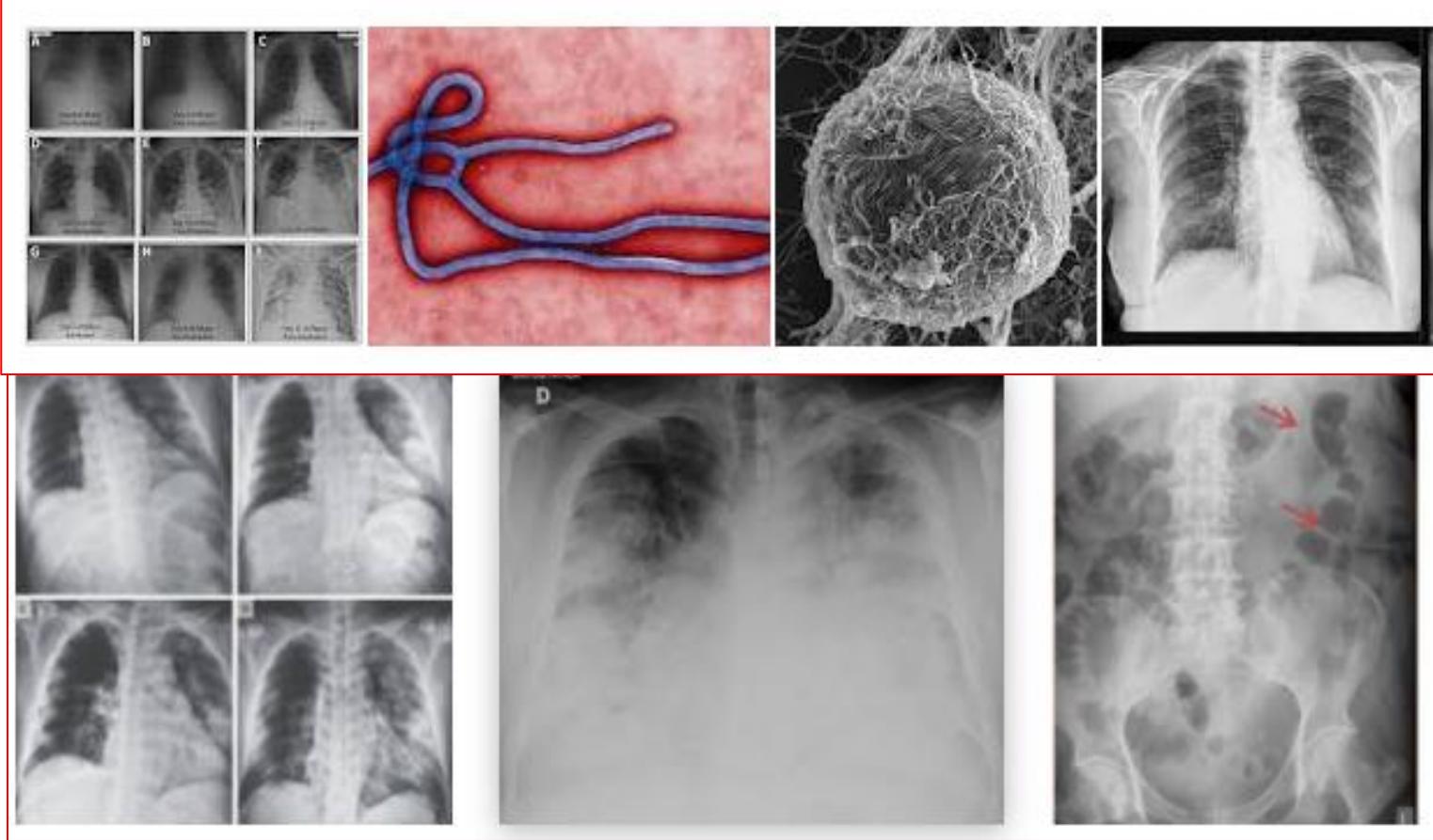


Fig: Ebola virus Training Dataset to the CNN Model

COVID data set using RNN: "Recurrent Neural Network: A Recurrent Neural Network (LSTM) implementation example using TensorFlow library.

```
from _future_ import print_function
```

```
import tensorflow as tf  
from tensorflow.contrib import rnn
```

Import Covid-19 data

```
from tensorflow.examples.tutorials.mnist import input_data  
mnist = input_data.read_data_sets("covid_dataset/", one_hot=True)
```

"To classify images using a recurrent neural network, we consider every image row as a sequence of pixels. Because Covid-19 image shape is 28*28px, we will then handle 28 sequences of 28 steps for every sample."

Training Parameters

```
learning_rate = 0.001  
training_steps = 10000  
batch_size = 128  
display_step = 200
```

Network Parameters

```
num_input = 28 # Covid-19 data input (img shape: 28*28)  
timesteps = 28 # timesteps  
num_hidden = 128 # hidden layer num of features  
num_classes = 10 # Covid-19 total classes (0-9 digits)
```

tf Graph input

```
X = tf.placeholder("float", [None, timesteps, num_input])  
Y = tf.placeholder("float", [None, num_classes])
```

Define weights

```
weights = {  
    'out': tf.Variable(tf.random_normal([num_hidden, num_classes]))}
```

```
biases = {  
    'out': tf.Variable(tf.random_normal([num_classes]))}
```

```
def RNN(x, weights, biases):
```

Prepare data shape to match `rnn` function requirements

Current data input shape: (batch_size, timesteps, n_input)

Required shape: 'timesteps' tensors list of shape (batch_size, n_input)

Unstack to get a list of 'timesteps' tensors of shape (batch_size, n_input)

```
x = tf.unstack(x, timesteps, 1)
```

Define a lstm cell with tensorflow

```
lstm_cell = rnn.BasicLSTMCell(num_hidden, forget_bias=1.0)
```

Get lstm cell output

```
outputs, states = rnn.static_rnn(lstm_cell, x, dtype=tf.float32)
```

Linear activation, using rnn inner loop last output

```
return tf.matmul(outputs[-1], weights['out']) + biases['out']
```

```
logits = RNN(X, weights, biases)
```

```
prediction = tf.nn.softmax(logits)
```

Define loss and optimizer

```
loss_op = tf.reduce_mean(tf.nn.softmax_cross_entropy_with_logits(  
    logits=logits, labels=Y))
```

```
optimizer = tf.train.GradientDescentOptimizer(learning_rate=learning_rate)
```

```
train_op = optimizer.minimize(loss_op)
```

Evaluate model (with test logits, for dropout to be disabled)

```
correct_pred = tf.equal(tf.argmax(prediction, 1), tf.argmax(Y, 1))
```

```
accuracy = tf.reduce_mean(tf.cast(correct_pred, tf.float32))
```

Initialize the variables (i.e. assign their default value)

```
init = tf.global_variables_initializer()
```

Start training

```
with tf.Session() as sess:
```

Run the initializer

```
sess.run(init)
```

```
for step in range(1, training_steps+1):
    batch_x, batch_y = mnist.train.next_batch(batch_size)
```

Reshape data to get 28 seq of 28 elements

```
batch_x = batch_x.reshape((batch_size, timesteps, num_input))
```

Run optimization op (backprop)

```
sess.run(train_op, feed_dict={X: batch_x, Y: batch_y})
```

```
if step % display_step == 0 or step == 1:
```

Calculate batch loss and accuracy

```
loss, acc = sess.run([loss_op, accuracy], feed_dict={X: batch_x, Y: batch_y})
```

```
print("Step " + str(step) + ", Minibatch Loss= " + \
      "{:.4f}".format(loss) + ", Training Accuracy= " + \
      "{:.3f}".format(acc))
```

```
print("Optimization Finished!")
```

Calculate accuracy for 128 mnist test images

```
test_len = 128
```

```
test_data = mnist.test.images[:test_len].reshape((-1, timesteps, num_input))
```

```
test_label = mnist.test.labels[:test_len]
```

```
print("Testing Accuracy:", \
```

```
      sess.run(accuracy, feed_dict={X: test_data, Y: test_label}))
```

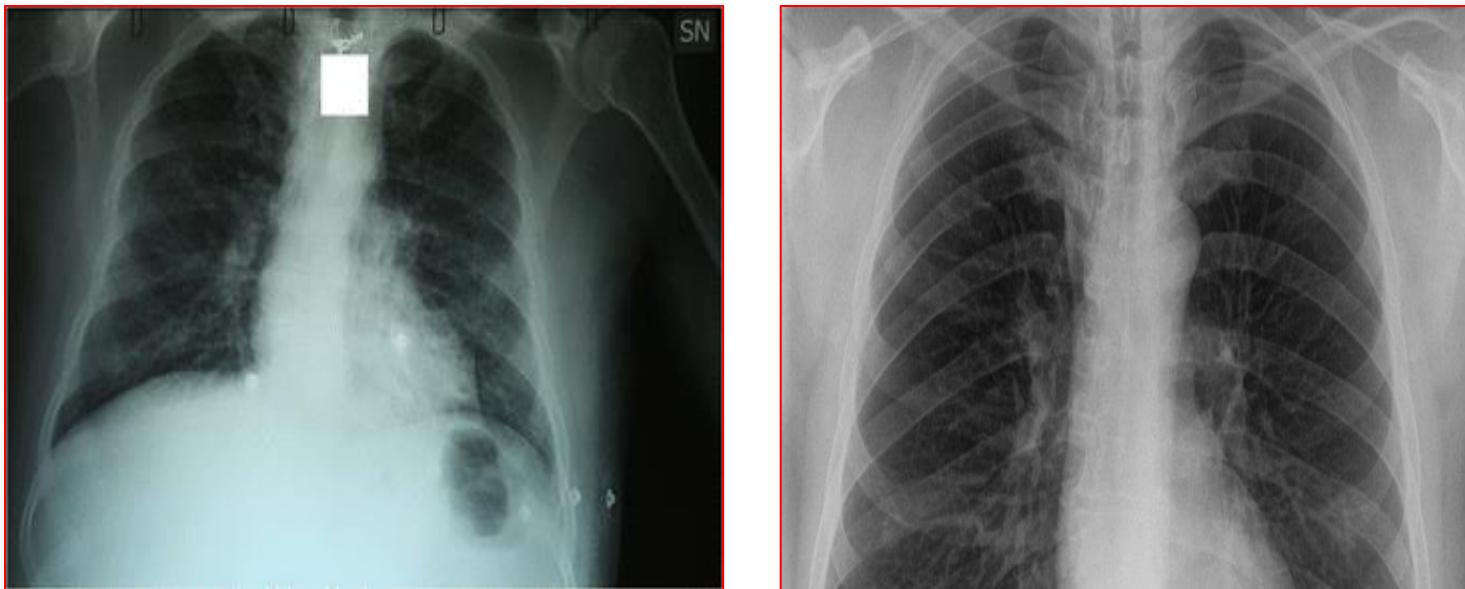


Fig: X-ray of Ebola virus vs. Normal Image

CONCLUSION

- ✓ This work demark the classified training data set into 8 successive phases. Out of 960 images, we have found, 149 COVID-19 positive, 234 pneumonia positive, 250 normal/ negative.
- ✓ In terms of numbers, each class is found to be approximately equal to others; reflecting our proposed MCNN and MRNN self-learn COVID-19 class characteristics. Especially so, not only based on the features but also from other two classes.
- ✓ Thus we conclude, that this model achieved an average accuracy of 89.62%, and 91.54% sensitivity for COVID-19 class; with an overall accuracy equal to 88.4% between 2 \pm ve folds.



Reach me @

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Fig: International Conference on Emerging Research In Computing, Information, Communication and Applications- ERCICA-2014.



Fig: Keynote Speaker @GITM, Proddatur, 2016



Fig: Resource Person for Workshop @MITS, Madanapalle, 2016



Mr. A. Srinivasulu, Associate Professor of IT Department, SVEC, Tirupati handled a session on 'Big Data Applications for Cyber Physical Systems'.



Fig: Jury Member @ MITS, Madanapalle, 2015



Fig: Keynote Speaker @ SITM, Renigunta, 2017



Fig: Doctorate Award @ JNTUA, Anantapur, A.P



Fig: Bharath Vidya Rathan Award @ Delhi, 2018

Dr ASADI SRINIVASULU

congratulations



TUTORS PRIDE

ITAP

AWARDS - 2020

Dr ASADI SRINIVASULU

BEST IT TEACHER OF THE YEAR

Activate Windows
Get Settings to activate Windows.

Scroll for details



0:26 / 0:28



Fig: ITAP Best IT Teacher Award @ Hyderabad, 2020



Fig: Best Local Chapter Award @ IITM, 2019



Fig: International Seminar @ Salem, 2019

INTERNATIONAL WORKSHOP ON
**“ BIG DATA ANALYTICS
USING SPARK ”**

WITH

DR.ASADI SRINIVASULU
Head -Research BlueCrest University Liberia



December 2020 | 11:00 AM (IST)

Jointly hosted by

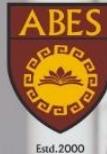


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University College
Monrovia - Liberia

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**Department of Computer Science & Engineering
under the banner of Computer Society of India**



ABES
Engineering College
College Code 032
Estd.2000



One Week Faculty Development Program on Essentials of Emerging Technologies (AI/ML/Deep Learning & Big Data) in Research



08th January 2021
02:00 pm - 04:00 pm

Resource Person



Dr. Asadi Srinivasulu
Head- Research, Blue Crest University,
Monrovia, Liberia

Topic: Big Data Analytics with SPARK

Organized by

Department of Computer Science

Merger of (CS, CE, CEIT)

Convener

Dr. Pankaj Kumar Sharma
Professor & Head (CS) ABESEC

Program Coordinators

Ms. Poonam Rana
Assistant Professor, CS Department **Ms. Vanshika Rastogi**
Assistant Professor, CS Department

Platform
Google Meet

Target Audience
Faculty Members



JAYA ENGINEERING COLLEGE

Thiruninravur
Chennai-602024



9th January 2021

3:00 PM – 4:00 PM

Department of Computer Applications

Proudly presents

A webinar on

“Big Data Analytics using SPARK”

Resource Person



Dr. Asadi Srinivasulu

Head-Research, Blue Crest University,
Monrovia, Liberia

Meeting url : <https://meet.google.com/hat-ytzr-onx>



Prof. Dr. A. KANAGARAJ
Chairman
Jaya Educational Trust

In the august presence of

Mrs. K. VIJAYA KUMARI
Secretary
Jaya Educational Trust

Er. K. NAVARAJ
Vice Chairman
Jaya Educational Trust

Dr. K. DEENA
Joint Secretary
Jaya Educational Trust

Prof. Dr. K. SAMIDURAI
Principal
Jaya Engineering College





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WEBINAR

BIG DATA ANALYTICS USING SPARK

27th February, 2021 | 2.30 PM Onwards

SPEAKER



Dr. Asadi Srinivasulu
HOD & Professor
BlueCrest University

Organized By Computer Department, M. M. Engineering College





DATA
SCIENCE

LEARN DATA SCIENCE

in

• RESEARCH TALKS •

with

DR. ASADI SRINIVASULU
Head Research and Masters

27

FEBRUARY
SATURDAY, 2021

TIME
11:30 AM - 12:30 PM
☎ +231 888999444, 888555800
✉ www.liberia.bluecrestcollege.com

Venue: School Auditorium - BlueCrest Building
Tubman Boulevard, Sinkor Rd. Monrovia, Liberia





Information Technology Department

Research and Consultancy Committee

University Level Webinar on

Big Data Analytics using Spark



Date: February 23, 2021

Time: 12:30 PM – 2:00 PM



Link: <https://meet.google.com/cxb-jprt-nqn>

Speaker: Prof. Dr. Asadi Srinivasulu

(Head- Research and Professor in Information Technology Department, Blue Crest University, Monrovia, Liberia)

Webinar Contents:

1. Introduction to Big Data
2. Characteristics of Big Data
3. Types of Big Data
4. Spark Transformation
5. Spark Actions
6. Spark Ecosystem
7. HDFS and MapReduce
8. Scala Programming
9. Classification using CNN
10. Clustering using CNN

Reference :<https://medium.com/@sophiamcleod99>

"Strategy: 2.1.2: Conduct Workshops/training programs to enhance research skills,
2.1.1: Encourage staff to undertake research and present their work in off-campus conferences/symposiums"

Organized by: Research and Consultancy Committee in association with HR Committee, IT

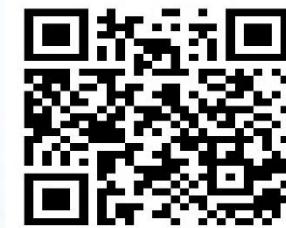
Dr. R. Venkateswaran
Chair- R & C Committee, IT

Dr. Fatima Al-Shanfari
HoD- Information Technology

Dr. Mohammed Rashid Al-Mamari
The Dean, UoTAS- Salalah



DATA
SCIENCE



<https://forms.gle/ii9N4EtZkvgXfPnu7>

TWO DAYS SYMPOSIUM **DATA SCIENCE** APPLICATIONS

in

• **HANDS-ON** •

with

DR. ASADI SRINIVASULU
Head Research and Masters

05 & 06
MARCH, 2021

TIME
09:30 AM - 04:30 PM
☎ +231 888999444, 888555800
✉ www.liberia.bluecrestcollege.com

Venue: School Auditorium - BlueCrest Building
Tubman Boulevard, Sinkor Rd. Monrovia, Liberia

veena@bluecrestcollege.com, abhishek.tiwari@bluecrestcollege.com



LEADER ID

Events Broadcast Contests Participants Publications Boiling points

Q entrance

School of Young Scientists: COVID-19 Strain Virus Detection

Online

March 31, from 13:30 to 15:00 (GMT +5)

Event completed

ALREADY INVOLVED:



and 21 more



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4:12 PM
5/7/2021



16 & 17

APRIL, 2021

09:30 AM - 04:30 PM

**VENUE: SCHOOL AUDITORIUM -
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SINKOR RD. MONROVIA, LIBERIA**

**REGISTRATION FEE:
\$30 USD**

BLUECREST LIBERIA

presents

**TWO DAYS SYMPOSIUM
BIG DATA
APPLICATIONS USING PYSPARK**



in

HANDS-ON

with

DR. ASADI SRINIVASULU
Head Research and Masters
&
MR. TARKESHWAR BARUA
Assistant Professor



for more info, email us:

Abhishek.tiwari@bluecrestcollege.com or veena@bluecrestcollege.com
+231 888999444, 888555800 www.liberia.bluecrestcollege.com

School of Young Scientists
Ural Federal University

CERTIFICATE OF PARTICIPATION

This certificate is awarded to

Dr Asadi Srinivasulu,
BlueCrest University, Monrovia, Liberia

for the report provided on March 31

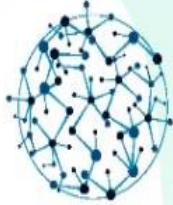
COVID-19 Strain Virus Detection

at the 2021 School of Young Scientists

Vasilii Borisov,
Organizing Committee



Russia
2021



DATA
SCIENCE



<https://forms.gle/i9N4Et2kvgXfPnu7>

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TWO DAYS SYMPOSIUM **DATA SCIENCE APPLICATIONS**

in

• **HANDS-ON** •

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DR. ASADI SRINIVASULU
Head Research and Masters

12 & 13
MARCH, 2021

TIME
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Venue: School Auditorium - BlueCrest Building
Tubman Boulevard, Sinkor Rd. Monrovia, Liberia



for more info, email us: AbhishekTiwari@bluecrestcollege.com or veena@bluecrestcollege.com



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Vice Chancellor
Bharathiar University
Coimbatore



Prof. Dr. K. MURUGAN
Registrar (i/c)
Bharathiar University
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Organizing

Virtual Short Term Training Program on Data Science and Statistical Applications
15.03.2021 to 22.03.2021

RESOURCE PERSONS



Dr. Syed Ejaz Ahmed
Dean
Brock University
Canada



Dr. Asadi Srinivasulu
Head - Research &
Professor of Information Technology
Blue Crest University, Liberia



Dr Akey Sunsheetha
Assistant Professor, Dept. of CSE
Adama Science and Technology
University Ethiopia



Dr. W. G. Samanthi Konarasinghe

Academic Director
Institute of Mathematics and
Management
Sri Lanka



Dr. N. Gnanasekaran

Assistant Professor
Department of Mechanical Engineering
National Institute of Technology
Surathkal , Karnataka



Dr.S.Suganthi

Professor and Head
Department of Data Science
Coimbatore Institute of Technology (CIT)
Coimbatore

Registration Link

<https://forms.gle/o97q6fHRfp1chEX8>

No Registration Fees

E-Certificate will be issued to all participants

Platform: Microsoft Teams

Time: 10 a.m. to 1 p.m. (IST)

Organizing Secretaries

Dr. S .Gandhiya Vendhan
Assistant Professor, Department of Statistics
Bharathiar University, Coimbatore
gandhiyavendhan@yahoo.com, 8508858098

Dr. R. Jahir Hussain

Associate Professor, Department of Mathematics
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DEPARTMENT OF SCIENCE AND HUMANITIES

DEPARTMENT OF PHYSICS

PROUDLY PRESENTS A NATIONAL WEBINAR ON

“IT CAREER AND OPPORTUNITIES”

ON THURSDAY, 27th MAY 2021

Chief Patrons:

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Chairman, LIET

Smt. Rizwana Begum
Secretary, LIET

Sri. Syed Touseef Ahmed
Vice Chairman, LIET

Patron:



Dr. C. V. Narsimulu
Principal, LIET



Dr. Asadi Srinivasulu

B.Tech(CSE), M.Tech(Intelligent Systems), Ph.D.

Head – Research & Professor of Information
Technology, Blue Crest University, Monrovia, Liberia,
South Africa.

Convenor:



Dr. J. Sasi Kiran
Dean I-Year, LIET

Co-Convenor:



Dr. Dadamiah PMD Shaik
HOD-Physics, LIET

Coordinators:

Mr. Haji Dattu
Asst. Prof, Physics Dept.
Ms. G. Sravani
Asst. Prof, Physics Dept.
Mr. S. Bhanu Prasad
Asst. Prof, Physics Dept.

Online Platform:



Timing: 4:00PM – 5:00PM

General Information:

- ❖ Link will be shared through Students Whatsapp group on the day of Webinar.
- ❖ e-Certificate will be issued to all the active participants after completion of Webinar.

For any queries e-mail to:
dr.dadamiahshaik@lords.ac.in

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presents

TWO DAYS SYMPOSIUM

DATA SCIENCE USING “R” PROGRAMMING



in

• **HANDS-ON** •

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Assistant Professor



28 - 29

MAY, 2021

09:30 AM - 04:30 PM

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**School of Computing and Information Technology
in association with Research and Innovation Council
Organises**

**International Panel Discussion on
IT Technology Trends in Strategic Sector and
Opportunities for Multidisciplinary Engineers**

Date: 10th June, 2021

Time: 11:00 A. M.

Resource Persons



Dr. Palaiahnakote Shivakumara
Department of Computer Systm & Technology
University of Malaya
Malaysia



Dr. Shashidhar G Koolagudi
Associate Professor & Head
Department of Computer Science & Engineering
NITK, Surathkal



Dr. Asadi Srivivasulu
Head - Research & Professor
Information Technology
BlueCrest University, Monrovia, Liberia



Mr. Vinod S Chippalkatti
President
Strategic Electronics Business Unit (SEBU)
Centum Electronics Limited, Bengaluru



Dr. J B Simha
CTO
ABIBA Systems, Bengaluru

Karpaga Vinayaga College of Engineering and Technology

G.S.T Road, Chinna Kolambakkam, Madhuranthagam(T.k), Chengalpattu(D.t)-603308

Invited Online Lecture on

Covid-19 Virus detection using Deep Learning Techniques

Registration Link

<https://forms.gle/KNLrhGVaKETu7b6W9>

16th June, 2021

Wednesday

| 5.00 PM - 6.00 PM

**Department
ECE**



**Dr. Asadi Srinivasulu,
Head & Research Professor
BluCrest University,
Liberia, West Africa**



A WEBINAR ON IMPLEMENTATION OF DATA SCIENCE APPLICATIONS USING MACHINE LEARNING ALGORITHMS.

ORGANIZED BY

**DEPARTMENT OF COMPUTER SCIENCE
AND ENGINEERING, & INFORMATION TECHNOLOGY**



**24th June 2021.
3 p.m. to 5 p.m.**

CHIEF PATRONS

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Chairman - VBIT
2. Dr. G. Manohar Reddy
Secretary - VBIT



PATRON

Dr. P.V.S Srinivas
Principal, VBIT

CONVENOR

Dr. G. Sreeram
HOD - CSE

COORDINATORS

1. Dr. Raju Dara
Professor, CSE
2. Mr. Padigela Praveen Kumar
Incharge Academics,
Assistant Professor, CSE



RESOURCE PERSON

Dr. ASADI SRINIVASULU

Professor,
R & D Director,
Blue Crest University, Monrovia, Liberia





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RESEARCH CONCLAVE 2021 FOR ACADEMICIANS

@ BlueCrest Liberia Headquarters,
Opp. CDC Headquarters, Congo Town,
Mon. Lib.

**JUNE
29
10:00 AM**

RESEARCH Creating New Knowledge



Fig: BlueCrest University College is organizing one day symposium on “Research Conclave-2021” on 29th, June, 2021 at BlueCrest University Campus, Monrovia, Liberia.

About the Webinar

The technology spreading its wings to cover the entire universe like an umbrella and mutating exponentially with data and intelligence factors being the prime components. Data science encompasses preparing data for analysis and processing, performing advanced data analysis, and presenting the results to reveal patterns and enable stakeholders to draw informed conclusions. Machine Learning and Deep Learning enables the computers with the capability to learn without being explicitly programmed. Keeping this in view, Department of Computer Science, Krishna University is organizing a National Webinar on "Data Science Applications using ML & DL Techniques" to impart the encroachments in current innovations, and privileged to inform and invite you to attend the webinar.

Important Dates :

Registration Start Date : 27-06-2021

Registration Last Date : 02-07-2021

webinar Date : 03-07-2021

Webinar Timings : 01.30 pm -04.30pm

e-Certificate: certificate will be awarded to all the participants

EMINENT SPEAKERS



Dr.Saroj Kumar Biswas

NIT Silchar

CONVENER



Dr.R. Vijaya Kumari,
Head.Dept.of Comp.Sc.



Dr. Asadi Srinivasulu,
BlueCrest University, Monrovia, Liberia

Webinar Director



Dr.R. Kiran Kumar
Asst.Professor.KRU

ORGANIZING COMMITTEE

Dr. D.G.KRISHNA MOHAN

Mr. P.L.N PRAKSAH KUMAR

Dr. Md. ALI MIRZA

Registration Link :

<https://forms.gle/aaQAGE2VaAfPt6s6A>



KRISHNA UNIVERSITY
MACHILIPATNAM

DEPARTMENT OF COMPUTER SCIENCE

ONE DAY NATIONAL WEBINAR ON DATA SCIENCE APPLICATIONS USING ML & DL TECHNIQUES

3rd July 2021

01.30pm -04.30pm



CHIEF PATRON



Prof. Y.K.Sundara Krishna
Registrar, Krishna University.



Prof.D.SuryaChandra Rao
Principal University College Arts &
Science ,Krishna University.

PATRONS



**International Virtual FDP on
EMERGING TECHNOLOGIES IN ROBOTICS AND AUTOMATION
ETRA – 2021,**

Organized by
Robotics and Automation -Sub Stream, Signal Processing, ECE

July 5th to July 9th 2021

In association with
IETE, Vijayawada Chapter

Time Schedule

Days	Time	Forenoon Session: 10.00am -12.00pm	12.00pm-2.00 pm
		Inaugural Function; July 05th, 2021, Time: 9.30am - 10.00am	
DAY-1 05.07.2021		Dr. Ngangbam Herojit Singh Assistant Professor in NIT Mizoram Department of Computer Science and Engineering Title: Intelligent System Design and Mobile Robotics.	Lunch Break
DAY-2 06.07.2021		Dr. N. SIVA KUMARAN Professor in NIT TRICHY Department of ICT Title: Industrial Automation	Lunch Break
DAY-3 07.07.2021		Dr. Subbulakshmi Nammalwar Associate Professor Department of Information and Communication Anna University, Chennai Title: Artificial Intelligence and Automation	Lunch Break
DAY-4 08.07.2021		Dr. Asadi Srinivasulu Head Research & Professor BlueCrest University, Monrovia, Liberia-91016, Title: Robotic Process Automation using UiPath	Lunch Break
DAY-5 09.07.2021		Mr. Chendra Garikipati Program Management Product Development Medical Devices Software Digital Technologies, Pleasanton, California, United States -463 Title: Industrial Robotics-Programming	Lunch Break
		Valedictory Function; July 9th 2021, Time: 4.00pm-5.00pm	



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Resource Persons



Prof. RAMANA MURTHY J V

Professor of Mathematics
National Institute of Technology
Warangal - 506004
Telangana, INDIA.



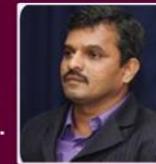
Prof. E. KESHLAVA REDDY

Professor of Mathematics &
Director of Evaluation
JNTUA Anantapur, A.P., INDIA.



Prof. ASADI SRINIVASULU

Head Research & Professor of IT
Blue Crest University, Monriva
Liberia-91016.



Prof. S VISWANADHA RAJU

Professor & Vice Principal
Computer Science & Engineering
JNTUH College of Engineering
Jagtial, Jagtial. Telangana , INDIA.



Dr. BANDRU MALLIKARJUNA

Assistant Professor of Mathematics
BMS College of Engineering (Autonomous)
Affiliated to VTU, Bangalore, INDIA.



Dr. S K RAJU CHAKRAVARTHULA

Assistant Professor of mathematics
Department of Mathematics
GITAM School of Science
Bengaluru campus. INDIA.



Dr. P. Sanjeeva Rayudu,
Principal, CREC (A), Tirupati.

12th to 17th July - 2021

(10.00 AM to 12.00 PM)

Registration Link:

https://docs.google.com/forms/d/e/1FAIpQLSdyrrUnzKhazTlwDODCQQHdTv3CGPNUbtLVx2pl3g3XISXM1w/viewform?usp=pp_url



Dr. Bhaskar Patel,
Director, CVS Krishna Theja Group of
Educational Institutions, Tirupati

E-Certificate will be Provided to the participants who attend the complete sessions

CONVENER

Dr KONDURU VENKATESWARA RAJU,
Associate Professor of Mathematics
& HOD , Dept of FME , CREC (A),
Tirupati, AP. Cell No. : 9502770029.
E-mail ID : venky.sakku@gmail.com

Dr. A.Sreenivasulu,
Associate Professor
8121583319

Ms.B.Geetha Lakshmi
Assistant Professor
900393864

Mr.T.Kumar
Assistant Professor
9299252723

Mr.T.Ramanjaneyulu
Assistant Professor
9398267291

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IQAC and Department of BCA and CS Jointly Organizes a
Trends in STEMEM 2.0

Date: 14th July to 18th July 2021

Time 11:00 am to 12:00 pm

Note: *. Zoom Link will be provided to the
registered Candidates via WhatsApp Group.



Dr. S. AMUTHA, CSE, Associate Professor, Saveetha Engineering College, Tamil Nadu
"Machine Learning in Medical Science"



Dr. G. Kishor Kumar, CSE, Associate Professor, RGM CET, Nandyal, Andra Pradesh
"Ensemble of Decision Trees for Robust Classification"



Dr. Asadi Srinivasulu, Head Research & Professor of IT,
BlueCrest University, Monrovia, Liberia - "Cloud Security using Big Data"



Dr. P. ITHAYA RANI, CSE, Associate professor, (KLEF) Deemed to be University Guntur Dt .
Vaddeswaram, Andhra Pradesh - "Machine Learning vs Deep Learning"



Mrs. Vaani Arun Prakash, Educator, Humanities & English Language Ministry of Education,
Queensway Secondary School Singapore - "Utilization of Technological Tools in Education"

Free Registration

E-Certificates will be provided on
successfull completion
of Five Days Webinar.

Any queries contact :

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Registration link :
<https://forms.gle/V9Avfp8teXGMP3YH8>

email: acasbca@gmail.com

website : www.annai college.com

Convener
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DR. ASADI SRINIVASULU
HEAD RESEARCH AND PROFESSOR OF IT,
BLUECREST UNIVERSITY

19TH
JULY
3PM TO 4PM
(IST)

REGISTER



WORKSHOP ON
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APPLICATIONS USING
ML AND DL TECHNIQUES



Organized by

DEPARTMENT OF COMPUTER APPLICATIONS

Resource Person



Dr. ASADI SRINIVASULU

Professor R&D Director,
Blue Crest University ,Monorovia,Liberia

A webinar on
**Data Science Applications using
Machine Learning Algorithms**

**FRIDAY, JULY 30, 2021
3PM TO 5PM**

Registration Link :
<https://forms.gle/hLPBphZBET9Hj3xq9>

Patrons

Sri. C.Gangi Reddy,Hon.Secretary,AET
Sri. C.Yella Reddy,Vice Chairman,AET
Sri. C.Abhishek Reddy,Executive Director,AET

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Dr.SMV Narayana

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July 31st, 2021

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MR. TARKESHWAR BARUA
Assistant Professor



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Aug. 07th, 2021

BlueCrest Liberia Auditorium

BlueCrest Building, Tubman Boulevrad,
Sinkor Rd., Monrovia, Liberia

for more info, email us:

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veena@bluecrestcollege.com

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WEBINAR

DATA SCIENCE APPLICATIONS
USING PYTHON

27th August, 2021 | 03:30 PM Onwards

SPEAKER

Dr. Asadi Srinivasulu



Head -
Research & Professor
of Information Technology at
BlueCrest University, Monrovia, Liberia

Organized By M. M. Engineering College

BlueCrest Liberia

presents

A ONE DAY WORKSHOP MOBILE APPLICATION DEVELOPMENT USING PYTHON



in

HANDS-ON

with

DR. ASADI SRINIVASULU
Head Research and Masters
&
MR. TARKESHWAR BARUA
Assistant Professor



Bluecrest Building, Tubman Boulevrad, Sinkor Rd., Monrovia, Liberia
abhishek.tiwari@bluecrestcollege.com | veena@bluecrestcollege.com
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OpenX Labs
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August
28th, 2021

REGISTRATION FEE:
\$30 USD

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Thindal, Erode, TN - 638 012.



SCHOOL OF COMPUTER SCIENCE

CHETANA – 2021

Organises an webinar on
"Data Science Applications using Machine Learning and Deep Learning Techniques"



Resource Person:

Dr. Asadi Srinivasulu

Head - Research & Professor of IT
Data Science Research Lab
BluCrest University, Liberia



30 Oct 2021



03.00 PM - 05.00 PM



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CONFERENCE HIGHLIGHTS

KEY NOTE SPEAKERS

DAY - 1



Dr. P. Malyadri
M.Com; Ph.D; PGDA
Senior Research Fellow, ICSSR



Dr. Dilip Kumar
DBA; HRM; Ph.D
Pro V.C GNS University



Dr. Asadi Srinivasulu
M.Tech, Ph.D.
Professor of IT & Head Research Data Science Research Lab
BluCrest University, Monrovia, Liberia



Mr. Sreepada
M.Com; FCMA
Past Chairman of Bengaluru
Chapter of the Institute of Cost Accountants of India



Dr Umesh Neelakantan
PhD Management Studies, FDP (IIMA)
President, Blue Crest University,
Monrovia Liberia

TRACK JUDGES

Entrepreneurship & Business Management



Dr. K.M Nagendra
B.E; MBA; Ph.D | Principal, BIMS

Marketing & E-Commerce



Dr. Bhavani M.R., Principal,
Surana College, M.Com, PGDBA, M.Phil, Ph.D

Human Resource Management



Dr. Leigh Anne Paul Dachapalli
Ph.D | Tshwane University of Technology,
Pretoria Campus, South Africa

Finance & Banking



Mr. Sreepada
Past Chairman of Bengaluru
Chapter of the Institute of Cost Accountants of India

Information Technology Management



Dr. Dinesh Elango
Ph.D | Martin de Tours School of Management and Economics,
Assumption University of Thailand, Bangkok, Thailand

Selected, quality research papers will be published in Journal of Exclusive Management Science(ISSN), UGC listed Journal. Ten best papers, along with a nominal cash reward, will also get a chance of getting published in the reputed journal of our associate countries.

Publication will be at extra cost.

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IMPORTANT DATES

Abstract & Full Paper Submission to be done on or before

15th November 2021 to ssmrv.ivcpg2021@gmail.com

Acceptance, Modification or Rejection will be notified by **18th November 2021**



جامعة التقنية والعلوم التطبيقية - صلالة

University of Technology & Applied Sciences - Salalah



IT DEPARTMENT (COLLEGE LEVEL WEBINAR)

Data Science Applications using Machine Learning and Deep Learning Techniques

Speaker : Prof. Dr. ASADI SRINIVASULU

BluCrest University , Liberia



Tuesday, 07 December 2021



12:15 - 2:00 PM



Google Meet ([Click here](#))



UTAS SALALAH



About VET IAS

VET Institute of Arts and Science (VETIAS), affiliated to Bharathiar University, Coimbatore, the youngest member of the Vellalar family is an intellectual community that nurtures student learning, fosters faculty research and creative activity.

The institution emphasises on collaborative learning, individual intellectual development, and respect for diverse points of view, preparing students to become critical thinkers, strong communicators and ethical leaders with global perspective.

Our students will graduate understanding that what they do beyond the classroom can make an impact on the world since knowledge, understanding and intellectual courage for a purposeful life are woven into the fabric of their education.



About the Department

The School of Computer Science with two UG departments of B.Sc (Computer Science) and B.Sc (Computer Science & Applications) was started in the year 2020, with the intake of 60 students and the department is facilitated with highly qualified, committed and expert members of faculty. The Department organizes several enhancing functions through the department association "**CHETANA**" to encourage the students and the members of faculty.

Objectives of the STTP

This STTP is essential to elevate the vision of members of faculty and research scholars by exposing them to the new development taking place in cyber security. The main objective of this STTP is to enrich knowledge and to provide an opportunity to exchange ideas on the topic of importance along with thought provoking technical sessions. The foundation of Machine learning/Big Data Analytics helps in understanding the current research areas and problems in different fields of Cyber Security.

Date	Topic & Resource Person
09.12.2021 Thursday	INAUGURAL SPEECH Dr. T. DEVI Professor and Head, Dept. of Computer Applications, Bharathiar University, Coimbatore.
09.12.2021 Thursday	Topic: Data Analytics Dr. ASADI SRINIVASALU Professor and Head Research, Dept. of Computer Science Blue Crest University, Liberia.
10.12.2021 Friday	Topic: Machine Learning Dr. T. P. LATUCHOMI Associate Professor, Dept. of Computer Science and Engg., SRM Deemed to be University, Chennai.
11.12.2021 Saturday	Topic: Cyber Security and Prevention Mr. S. JAGANRAJ Senior Software Engineer, Global Relay Communications, Canada.
13.12.2021 Monday	Topic: Role of Data Analytics in Healthcare Dr. M. NACHAMAI Specialist-Research and Technologist Siemens Healthcare Private Limited, Bangalore.
14.12.2021 Tuesday	Topic: Mining the Crime Data Dr. M. VIJAYAKUMAR Associate Professor, Dept. of Computer Science, K.S.R. Arts and Science College, Tiruchengode.
15.12.2021 Wednesday	Topic: Machine Learning for Cyber Security Dr. J. SOMASEKAR Professor and Head, Dept. of Computer Science and Engg., Gopalan College of Engineering and Management, Bangalore.
16.12.2021 Thursday	Topic: Cyber Data Analytics Dr. V. BHUVANESWARI Associate Professor, Dept. of Computer Applications, Bharathiar University, Coimbatore.
17.12.2021 Friday	Topic: Machine Learning & Its Applications Dr. V. K. MANAVALASUNDARAM Professor and Head, Dept. of Information Technology, Vellalar College of Engineering and Technology, Erode
18.12.2021 Saturday	Topic: Awareness on Cyber Security Issues Mr. S. KARTHIKEYAN Cyber Security Specialist, Vetri Tech Solutions, Coimbatore.
20.12.2021 Monday	Topic: Cyber Data Security Dr. V. BABY DEEPA Associate Professor, Dept. of Computer Science, Govt. Arts College (Autonomous), Karur. VALEDICTORY SPEECH Dr. R. SANKARA SUBRAMANIAN Principal, Erode Arts and Science College (Autonomous), Erode



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Online Ten Day Short Term Training Program (STTP) on Cyber Data Analytics

Organized by

School of Computer Science



09th- 20th December 2021





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SCHOOL OF COMPUTER SCIENCE

CHETANA – 2021

Organises an

Online Ten Day Short Term Training Program on Cyber Data Analytics

Topic:
"Data Analytics"

Resource Person:

Dr. Asadi Srinivasulu

Head - Research &
Professor of IT, Data Science Research Lab,
BlueCrest University College,
Liberia, West Africa.



BlueCrest
University
College

09 Dec 2021

ZOOM

11.45 AM to 01.00 PM



Maratha Vidya Prasarak Samaj's
Karmaveer Adv. Baburao Ganpatrao Thakare
College of Engineering

Udoji Maratha Boarding Campus, Gangapur Road, Nashik, Maharashtra 422013



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Department of Information Technology
in association with
Internal Quality Assurance Cell (IQAC)
is organizing an

INTERNATIONAL WEBINAR

DATA SCIENCE APPLICATIONS USING ML AND DL TECHNIQUES

Saturday, 18th December 2021 | 3.30 PM



Speaker

Dr. Asadi Srinivasulu

Professor, IT and Head Research
Data Science Research Lab.,
Blucrest University – 91016,
Monrovia, Liberia

Programme Schedule for FDP

Dates	8.30am - 10.00am	10.30am - 12.00pm	1.00pm - 3.30pm
Monday 17.01.2022	Data Analytics in Healthcare Dr. Madhavan Mukund Director & Professor Chennai Mathematical Institute	Python Introduction to Data Analytics Dr. R. S. Milton Professor SSN College Of Engineering	Hands-on training on Python programming for Data Analytics Mr. B. Senthil Kumar Assistant Professor SSN College Of Engineering
Tuesday 18.01.2022	Traditional Learning Algorithms for Healthcare Dr. S. Kavitha Associate Professor SSN College Of Engineering	Deep Learning for Healthcare Applications Dr. Asudi Srinivasulu Professor of IT & Head Research Data Science Research Lab BlueCrest University	Hands-on Training on Learning Algorithms Dr. J. Bhuvana & Dr. B. Bharathi Associate Professor SSN College Of Engineering
Wednesday 19.01.2022	Social Media Data Analysis for Healthcare Applications Dr. R. Rajalakshmi Associate Professor Vellore Institute of Technology, Chennai	Building Predictive Models for Social Media Data Dr. Geetha Raju, Machine Learning Engineer NLP TamilNadu e-Governance Agency	Data Analytics using IoT Devices in Healthcare Dr. S. Chithra Associate Professor SSN College Of Engineering
Thursday 20.01.2022	Machine Learning Formulations for Histopathology Images Dr. C. V. Jawahar Professor IIIT Hyderabad	Text Analytics using Learning Algorithms for Healthcare Mr. Gopinath Mr. Venkatesh Research Engineers Saama Technologies	Hands-on Training on Data Collection from Social Media, Annotation and Inter-rater Agreement Dr. Atul Kumar Ojha Dr. Bharathi Raja Chakravarthi Dr. John McCrae NUI Galway, Ireland
Friday 21.01.2022	Deciphering Clinical Narratives – key to automated Decision Making in Health Care Dr. Lipika Dey Chief scientist TCS Research and Innovation	Analysis of Mental Health using Social Media Data for Suicidal Identification Dr. M. Anand Kumar Associate Professor National Institute of Technology, Surathkal	Hands-on Training on Detecting Depression from Social Media Dr. D. Thenmozhi & S. Kayalvizh SSN College Of Engineering
Saturday 22.01.2022	Impact of Social Media in Mental Health Dr. V. Sunilkumar Clinical Psychologist & Founder Mind Zone	Learning Algorithms for Healthcare Applications using Medical Images Dr. T. T. Minalinee Professor SSN College of Engineering	Hands-on training on Disease Diagnosis from Medical Images Dr. P. Mirunalini & Dr. A. Beulah Associate Professor SSN College Of Engineering

<https://www.ssn.edu.in/>

17-01-2022
To
22-01-2022



Thank You



Thanking You Sir