Prior Knowledge

TeamID	PNT2022TMID51786
ProjectName	Project-ANovelMethodforHandwrittenDigit RecognitionSystem

OneshouldhaveknowledgeonthefollowingConcepts:

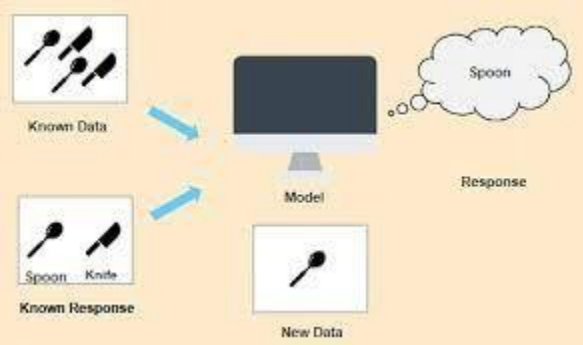
1. Supervisedandunsupervisedlearning

Machine Learning:Machine learning is a branch of artificial intelligence (AI) and computer
t sciencewhichfocusesontheuseofdataandalgorithmstoimitatethewaythathumanslearn, graduallyimprovingitsaccuracy

TypesofMachineLearning:

1. Supervisedlearning:

- Insupervisedlearning,themodelisabletopredictwiththehelpofa labeleddataset.
- We train the machines using the "labeled" dataset, and based on the training,themachinepredictstheoutput.Here,thelabeleddataspecifies thatsomeoftheinputsarealreadymappedtotheoutput.
- First,wetrainthemachinewiththeinputandcorrespondingoutput,and thenweaskthemachinetopredicttheoutputusingthetestdataset.



CategoriesofSupervisedLearning:

1. **Classification:** Classification algorithms are used to solve the classificationproblemsinwhichtheoutputvariableiscategorical.The classificationalgorithmspredictthecategoriespresentinthedataset.
2. **Regression:** Regression algorithms are used to solve regression problemsinwhichthereisalinearrelationshipbetweeninputandoutput variables.Theseareusedtopredictcontinuousoutputvariables

2. Unsupervisedlearning

- Inunsupervisedlearning,themodelisabletopredictwiththehelpofan unlabeleddataset.
- Themachineistrainedusingtheunlabeleddataset,andthemachine predictstheoutputwithoutanysupervision.
- In unsupervised learning, the models are trained with the data that is neitherclassifiednorlabeled,andthemodelactsonthatdatawithoutany supervision.

2. RegressionClassificationandClustering

Clustering:

Clustering is an unsupervised technique.With clustering, the algorithm tries to find a patternindatasetswithoutlabelsassociatedwithit.Thiscouldbeaclusteringofbuying behavior of customers. Features for this would be the household income, age, and clustersofdifferentconsumerscouldthenbebuilt.

Classification:

Classificationalgorithmslookatexistingdataandpredictwhatnewdatabelongsto.

Regression:

Regressionmodelsareusedtopredictacontinuousvalue.Example:Predictingpricesof ahousegiventhefeaturesofhouselikesize,priceetc

3. ArtificialNeuralNetworks

Artificialneuralnetworkreferstoabiologicallyinspiredsub-fieldofartificialintelligence modeled after the brain. An Artificial neural network is usually a computational network basedonbiologicalneuralnetworksthatconstructthestructureofthehumanbrain.
Similar to how a human brain has neurons interconnected to each other, artificial neural networks also have neurons that are linked to each other in various layers of the networks. These neurons are known as nodes. An Artificial Neural Network in the field of Artificial intelligence where it attempts to mimic the network of neurons makes up a human brain so that computers will have an option to understand things and make decisions in a human-like manner. The artificial neural network is designed by programming computers to behave simply like interconnected brain cells.

Artificial Neural Network primarily consists of three layers:

InputLayer:

As the name suggests, it accepts inputs in several different formats provided by the programmer.

HiddenLayer:

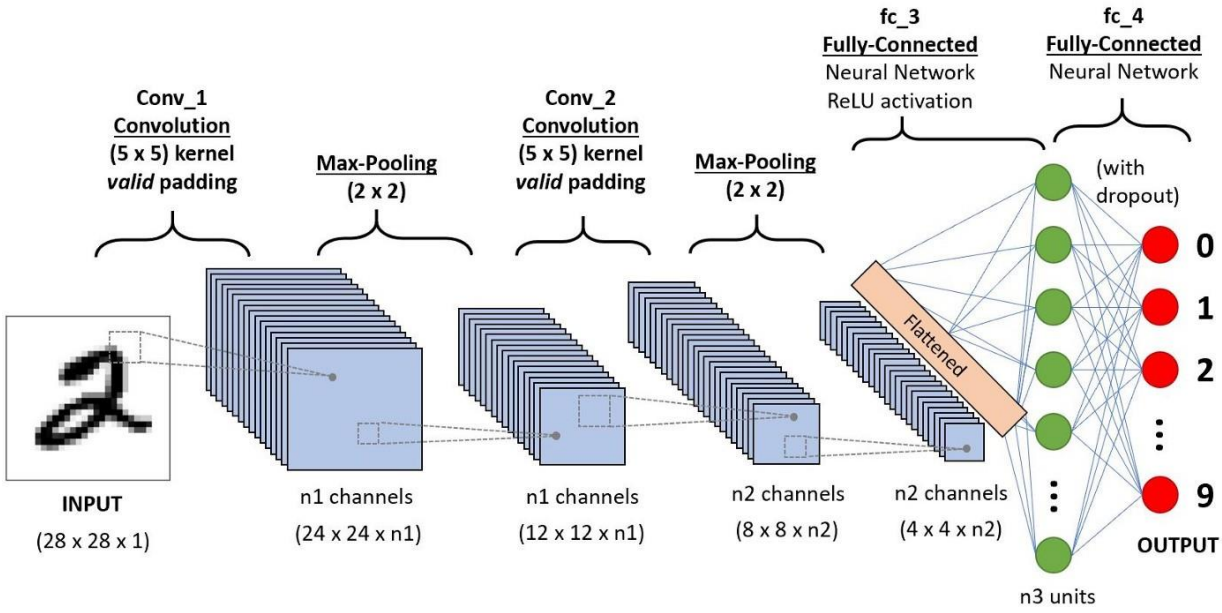
The hidden layer presents in-between input and output layers. It performs all the calculations to find hidden features and patterns.

Output Layer:

The input goes through a series of transformations using the hidden layer, which finally results in output that is conveyed using this layer.

4. Convolution Neural Networks

A Convolutional Neural Network is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.



5. Flask

Flask is used for developing web applications using python