



AIM:- Implement Inferencing with Bayesian Network in Python

Network in Python

THEORY:-

Inferencing with Bayesian Network in Python.

- ⇒
  - In this Bayesian Network is used to solve the Monty Hall Problem.
  - This problem entails a competition in which a contestant must choose one of the three doors, one of which conceals a prize.
  - The show's host (Monty) unlocks an empty door & ask the contestant if he wants to swap the other door after the contestant has chosen one.
  - The decision is whether to keep the current door or replace it with a new one.
  - It is preferable to enter with the other because the prize is more likely to be higher.
  - To come out from this ambiguity it needs to model with Bayesian Network.
- For this Python Based Package pgmpy is used and it is a Bayesian Network implementation written entirely in Python with a focus on Modularity & Flexibility.

CONCLUSION:- Henceforth, Implemented Inferencing with Bayesian Network in Python.



## EXPERIMENT NO! - 2

Aim:- Implement Cognitive Computing in Customer Service.

SOFTWARE REQUIREMENT- Python, Vs Code.

### THEORY:-

Implementing Cognitive Computing in Customer Service

- Cognitive Computer system can recognize the sentiment behind a caller's word in real time & help the agents to respond in more effective manner.
- The ability to convert upset customers into neutral or happy customers during a chatbot or a phone call helps lead to better customer retention for a company.
- Cognitive Assistance automate the routine customer care, freeing live agents to focus on high value interactions.
- Cognitive Insights help the contact centre to improve the operational efficiency.
- Cognitive solutions streamline multi-channel support, including Social Media.

CONCLUSION!- Henceforth, Implemented Cognitive Computing in Customer Service.

EXPERIMENT NO:- 3

AIM:- Implementation of Fuzzy membership Function.

SOFTWARE REQUIREMENT:- Python.

THEORY:-

Fuzzy Membership Function



- It is used to convert the crisp Input provided to the fuzzy Inference system.
- Fuzzy logic is itself not fuzzy, rather it deals with the fuzziness in data.
- And this fuzziness in the data is best described by the Fuzzy membership function.
- Fuzzy membership function is the graphical way of visualizing the degree of membership of any value in a given fuzzy set.
- In the graph, X axis represents the universe of discourse and Y axis represents the degree of membership in the range [0,1].
- Support:- elements having non-zero degree of membership.
- Core:- set with elements having degree of 1.
- $\alpha$ -Cut:- set of elements with degree  $\geq \alpha$ .
- Height:- Maximum degree of Membership.

CONCLUSION:- Henceforth, Implemented the Fuzzy membership function.



## EXPERIMENT NO: 4

AIM:- Implementation of Fuzzy set Properties.

S/W REQUIREMENT:- Python

THEORY:-

Properties of Fuzzy set.

- The properties of fuzzy sets help us to simplify many mathematical fuzzy set operations.
- Sets are collection of unordered, distinct elements.

A). Involution

- States that the complement of complement is the set itself.  $(A')' = A$

B). Commutativity

- Operations are called Commutative if the order of the operands does not alter the results.

Fuzzy sets are commutative under Union & Intersection operations.

$$\underline{A} \cup \underline{B} = \underline{B} \cup \underline{A}$$

$$\underline{A} \cap \underline{B} = \underline{B} \cap \underline{A}$$

C). Associativity

- It allows to change the order of operations performed on operand, however relative order of operand can not be changed.

$$\underline{A} \cup (\underline{B} \cup \underline{C}) = (\underline{A} \cup \underline{B}) \cup \underline{C}$$

$$\underline{A} \cap (\underline{B} \cap \underline{C}) = (\underline{A} \cap \underline{B}) \cap \underline{C}$$

D) Distributivity

$$\Rightarrow \underline{A} \cup (\underline{B} \cap \underline{C}) = (\underline{A} \cup \underline{B}) \cap (\underline{A} \cup \underline{C})$$

$$\underline{A} \cap (\underline{B} \cup \underline{C}) = (\underline{A} \cap \underline{B}) \cup (\underline{A} \cap \underline{C})$$

E). Absorption

$\Rightarrow$  It produces the identical sets after stated union & intersection operations.

$$\underline{A} \cup (\underline{A} \cap \underline{B}) = \underline{A}$$

$$\underline{A} \cap (\underline{A} \cup \underline{B}) = \underline{A}$$

F). Identity :-

$$\underline{A} \cup \phi = \underline{A}$$

$$\underline{A} \cap \phi = \phi$$

$$\underline{A} \cup X = X$$

$$\underline{A} \cap X = \underline{A}$$

G). Transitivity

$\Rightarrow$  If  $\underline{A} \subseteq \underline{B}$  and  $\underline{B} \subseteq \underline{C}$  then  $\underline{A} \subseteq \underline{C}$ .

CONCLUSION! - Thus, Implemented the fuzzy set properties.

AIM:- Implement Image Classification System.

SOFTWARE REQUIREMENT:-

THEORY:-

IMAGE CLASSIFICATION:-

- ⇒ Image classification is a method to classify way images into their respective category classes using some methods like:
  - Training a small N/W from scratch.
  - Fine-Tuning the top layers of the model using VGG16.
  - The goal is to specify and classify the image by assigning it to a specific label.
  - Image classification is an fundamental task that attempts to comprehend an entire image as a whole.
  - Typically, Image classification refers to images in which only one object appears and is analyzed.
  - The image classification problems requires determining the category (class) than an image belongs to.

CONCLUSION:- Henceforth, Implemented Image Classification System



EXPERIMENT NO: 6

AIM:- Implementing Deep Learning Application & Handwritten Digit Recognition System (using MNIST Dataset).

THEORY:-

DEEP LEARNING:-

- It is a machine learning technique that teaches computer to do what comes naturally to humans: learn by example.
- It is a key technology behind driverless cars, enabling them to recognize a stop sign or to distinguish a pedestrian from a lamp post.
- In Deep Learning, a computer model learns to perform classification task directly from Images, Text or Sound.
- Deep Learning models can achieve state of the art accuracy, sometimes exceeding human level performance.

HAND WRITTEN DIGIT RECOGNITION:-

- - It is simply the ability of a machine or a computer to take handwriting - from various physical & digital sources - & Interpret it as text on the screen.
- The input could also be in the form of an image with handwritten text.



- Handwritten Recognition gives machines to have the ability to read handwriting as actual text and convert it into digital form.
- It is a hard task for the machine because handwritten digits are not perfect & can be made with many different flavours.
- The Handwritten Digit Recognition is the solution to this problem which uses the image of a digit and recognizes the digit present in the Image.

#### CONCLUSION:-

Henceforth, successfully Implemented Deep Learning Application & Handwritten Digit Recognition System using (mnist Dataset).



## EXPERIMENT NO:- 7

AIM:- Implementation of Supervised Learning  
Algorithm : Random Forest.

### THEORY:-

#### Supervised Learning:-

- It is also known as Supervised Machine Learning which is a subcategory of Machine Learning and Artificial Intelligence.
- It's defined by its use of labeled datasets to train the algorithms that to classify data or predict outcomes accurately.
- As the i/p data is fed into model, it adjust its weights until the model has been fitted appropriately which occurs as a part of the cross validation process.
- Supervised learning helps the organization solve for a variety of real world problems at a scale, such as classifying spam in a separate folder from your inbox.

#### Random Forest:-

- - Random Forest is a Supervised Machine Learning Algorithm that is used widely in classification & Regression Problems.
- It builds decision trees on a different sample and takes their majority vote for the



- classification and average in case of Regression.
- One of the most important features of the Random Forest Algorithm is that it can handle the dataset containing various continuous variables as in the case of classification, Regression and Categorical variables as in the case of the classification.
  - It performs better results for classification problems.
  - It is based on the concept of Ensemble learning which is a process of combining multiple classifiers to solve a complex problem and to improve the performance of the model.

CONCLUSION:- Henceforth, we have studied about the Random Forest Algorithm in Supervised Learning.



EXPERIMENT NO: 8

AIM :- Implementation of Supervised Learning Algorithm:  
Ada Boosting.

THEORY:-

- Supervised Learning Algorithm:

- It is the type of Machine Learning in which machines are trained using well "labelled" training data and on basis of that data machine predicts the output.
- The labelled data means some input data is already tagged with the correct output.
- It is a process of providing input data as well as correct output data to the Machine Learning model.
- The aim of Supervised Learning Algorithm is to find a mapping function to map the i/p variable ( $x$ ) with the o/p variable ( $y$ ).
- In the real world, supervised learning can be used for risk assessment, image classification, fraud detection, spam filtering, etc.

• ADA - BOOSTING:

- It was the first successful boosting algorithm developed for the purpose of binary classification.
- AdaBoost is a short of Adaptive Boosting and is a very popular technique that combines multiple "weak classifier" into a single



"strong classifier":

- It was formulated by the Year Friends R. Robert Schapire. They also won the 2003 Gödel Prize for their work.

- Algorithm:

- 1) Initialize the dataset and assign equal weight to each of the data point.
- 2) Provide this as input to the model & identify the wrongly classified data points.
- 3) Increase the weight of the wrongly classified data points.
- 4) if (get required results)  
    Goto step 5  
    else  
    Goto step 2
- 5) End.

- CONCLUSION:-

Thus, we have studied about the Ada-Boosting Algorithm in Supervised Learning.



## EXPERIMENT NO:- 9

AIM:- Build Text Based OS Application:  
Sentiment Analysis.

### THEORY:-

#### Sentiment Analysis:

- - It is the process referred to as an Opinion Mining, is an approach to natural language Processing (NLP) that identifies the emotional tone behind a body of text.
- This is a popular way for organizations to determine and categorize opinions about a product, service or idea.
- It involves the use of Machine Learning, data Mining and Artificial Intelligence to mine text for the sentiment and subjective information.
- The system helps organization to gather insights from Unorganized & unstructured text that comes from Online Sources such as emails, blog posts, support Tickets, web chat, Social Media channels, forums & comments.

#### CONCLUSION:

Thus we have studied about text Based OS Application - using sentiment Analysis.



## EXPERIMENT No: 10

AIM:- Build Arduino Based OS Application:  
Music Genre Classification

### THEORY:-

#### MUSIC GENRE CLASSIFICATION:-

- - Audio processing is one of the most complex task in data science as compared to image processing & other such classification techniques.
- One such Application is Music Genre Application which aim to classify the Audio File in certain Categories of song to which they belong.
- The application is very important & requires automation to reduce the manual labour & time because if we have to classify the music manually then one has to listen out each file for the complete duration.
- So as to automate the process we use machine learning and deep learning Algorithms.

### CONCLUSION:-

- Thus, we have build Audio - Based OS Applications (music genre & classification).