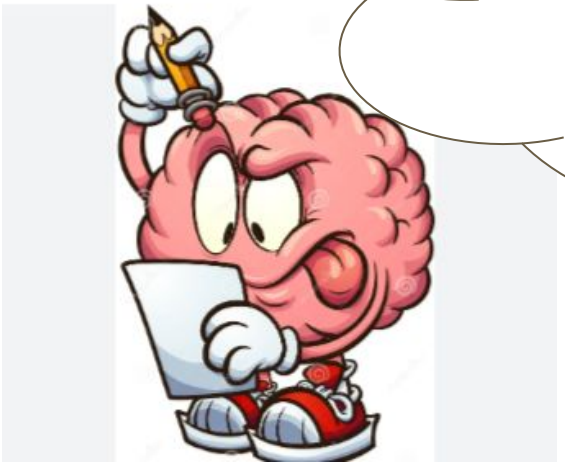
Feed Forward Neural Network

Presented by:-
Vedant Rakesh Mukhekar[381046]
Siddhesh Joshi[381031]

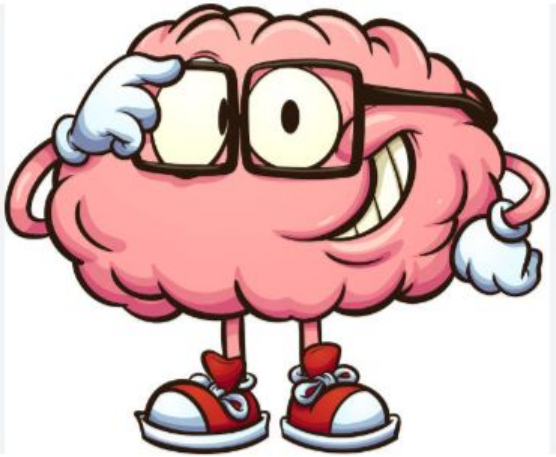
Introduction

USING CHAT GPT FOR HUMANS ASSIGNMENTS IS REALLY VERY EASY BUT A QUESTION STRIKES MY MIND WHAT IS THE FACTOR WHICH MAKES IT BETTER THAN ME AS MOST OF THE PEOPLE NOW A DAYS STOPPED USING ME!!!!!!!!



INTRODUCTION

THE SIMPLE ANSWER IS THE AI HAS SOMEWHAT MORE EFFICIENT NEURAL NETWORK THAN WHAT WE HAVE



NEURAL NETWORK

1. Biological Inspiration: Neural networks are inspired by the human brain, with neurons and synapses mimicking biological counterparts. This connection to neuroscience makes them fascinating to explore.

2. Learning from Data: Unlike traditional programming, neural networks learn from data. This ability to adapt and improve based on experience is a key advantage.

3. Real-World Applications: Neural networks are used in a wide range of applications, from self-driving cars to medical diagnosis. Their real-world impact is impressive.

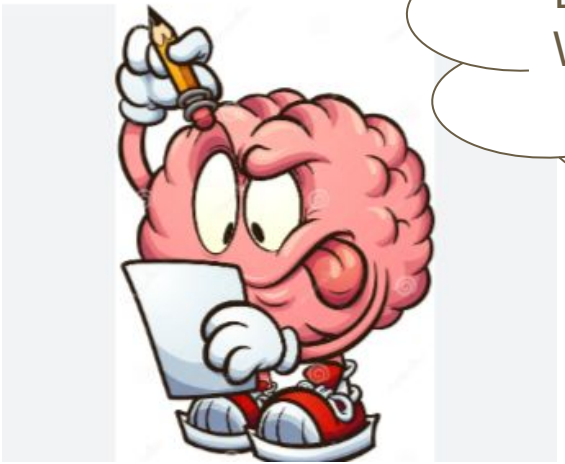
4. Breakthroughs in AI: Many recent advancements in artificial intelligence, such as natural language processing and image recognition, have been driven by neural networks.

5. Evolving Architecture: Neural network architectures are constantly evolving, with new types like recurrent neural networks and generative adversarial networks being developed to tackle specific tasks.

6. Ethical Considerations: The increasing capabilities of neural networks raise ethical questions about their use in areas like surveillance, autonomous weapons, and decision-making.

7. Future Potential: Neural networks hold immense potential for solving complex problems and advancing human society in various fields.

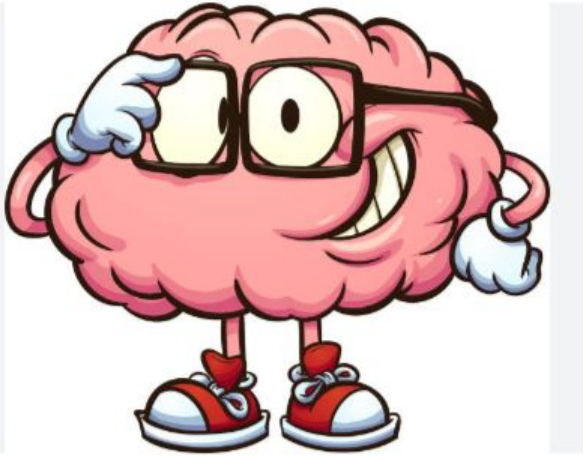
NEURAL NETWORK



BUT HOW DO IT WORKS REALLY WELL UNLIKE WE DO????

NEURAL NETWORK

THE ANSWER IS THAT IT HAS A WELL VERSED ARCHITECTURE WHICH MAKES IT WORK AS EFFICIENT AS WE DO



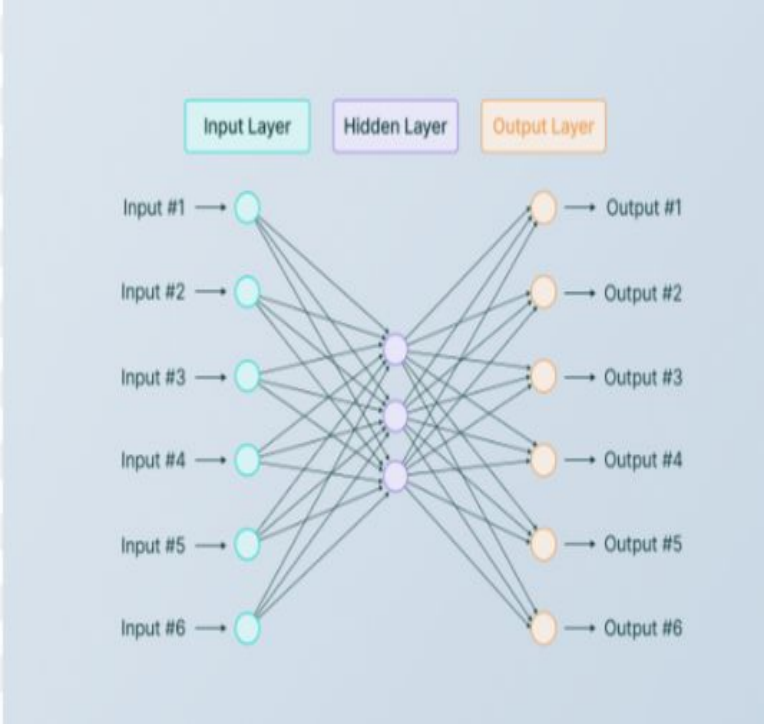
ARCHITECTURE OF NEURAL NETWORK

Neural Network: A computational model inspired by the human brain, designed to process information and learn from data. It consists of interconnected nodes called neurons, organized into layers.

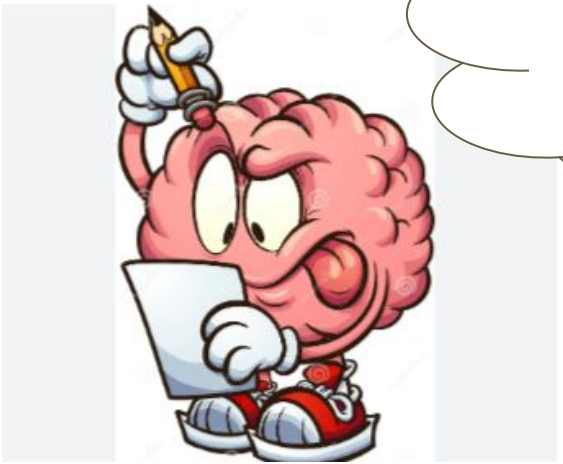
Input Layer: The first layer of a neural network that receives external data as input.

Hidden Layer(s): Intermediate layers between the input and output layers. They process the input data and extract relevant features.

Output Layer: The final layer of a neural network that produces the output or prediction based on the processed information from the hidden layers



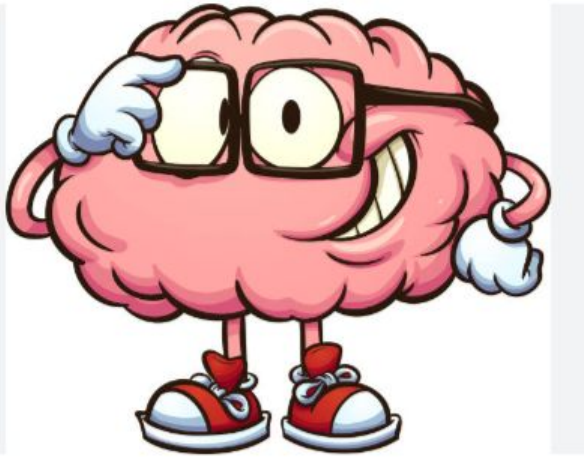
NEURAL NETWORK



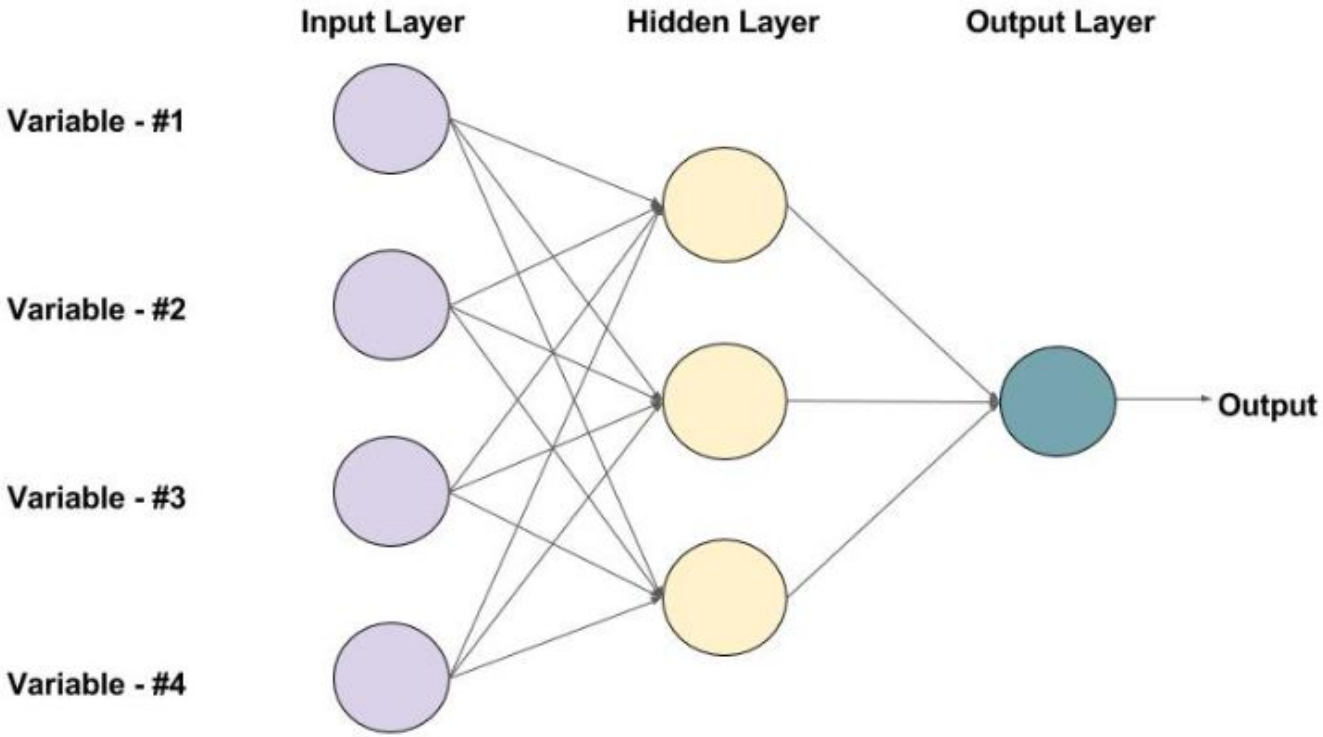
SO WHICH IS THE NEURAL NETWORK WHICH IS MORE SIMPLER,FLEXIBLE AND FAST.....

NEURAL NETWORK

OHH ITS A FEED FORWARD NEURAL NETWORK



FEED-FORWARD NEURAL NETWORK ARCHITECTURE



FEED-FORWARD NEURAL NETWORK WORKING

Here's how they work:

1. **Input Layer:** The network receives input data, which is represented as a vector of numerical values.
2. **Hidden Layers:** These layers process the input data and extract relevant features.
3. **Output Layer:** The final layer produces the output or prediction based on the processed information.
4. **Neurons:** Each neuron in a layer is connected to neurons in the next layer.
5. **Weights:** The strength of these connections is determined by weights.
6. **Activation Functions:** Non-linear functions applied to the weighted sum of inputs to introduce non-linearity.
7. **Training:** The network is trained using a dataset to adjust the weights to minimize the error between predicted and actual outputs.

FEED-FORWARD NEURAL NETWORKS ADVANTAGES

1.Simplicity: FFNs have a straightforward architecture, making them easier to understand and implement compared to more complex networks like RNNs or CNNs.

2.Versatility: FFNs can be used for a wide range of tasks, from simple regression to complex pattern recognition problems.

3.Efficiency: Compared to deeper networks, FFNs can be trained more efficiently due to their simpler structure.

4.Interpretability: While not as interpretable as linear models, FFNs are often more interpretable than other deep learning models, especially when using techniques like feature importance analysis.

5.Foundation for Other Networks: FFNs serve as the foundation for many other types of neural networks, such as recurrent neural networks (RNNs) and convolutional neural networks (CNNs).

CASE STUDY

Case Study: Image Classification with FFNs vs. Traditional Methods

Problem: Classifying images of handwritten digits (0-9).

Traditional Methods:

- **Support Vector Machines (SVMs):** A popular machine learning algorithm for classification.
- **K-Nearest Neighbors (KNN):** A simple algorithm that classifies based on the majority class of the k nearest neighbors.

FFN Approach:

- A feedforward neural network with multiple hidden layers, using ReLU activation functions and backpropagation for training.

CASE STUDY

Results:

- **Accuracy:** FFNs consistently outperform SVMs and KNN on this task, achieving significantly higher accuracy rates.
- **Efficiency:** While FFNs can be computationally expensive to train, they often offer better performance, making them more efficient in terms of accuracy.

Why FFNs Excel:

- **Non-linearity:** FFNs can learn complex, non-linear patterns in the image data, which is essential for accurate classification.
- **Feature Learning:** FFNs can automatically learn relevant features from the raw image data, eliminating the need for manual feature engineering.
- **Scalability:** FFNs can handle large datasets and complex image classification tasks more effectively than traditional methods.

FACT BUSTER

Historical Roots: FFNs trace their origins back to the 1940s, with pioneers like McCulloch and Pitts laying the groundwork for artificial neural networks.

Backpropagation Breakthrough: The development of the backpropagation algorithm in the 1980s revolutionized FFNs, enabling them to learn complex patterns effectively.

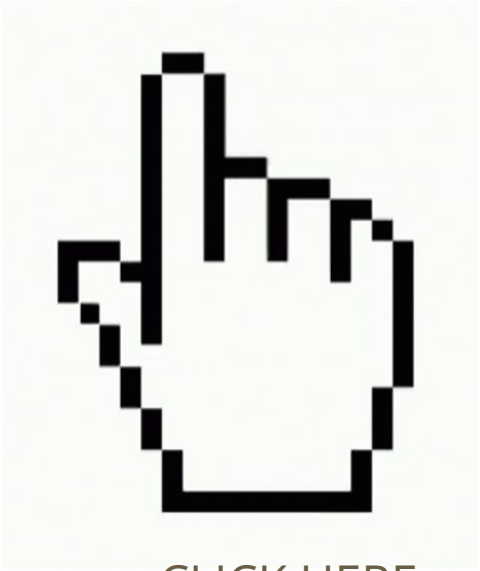
Versatility: FFNs are incredibly versatile, capable of tackling a wide range of tasks from image recognition to natural language processing.

Real-World Impact: FFNs have become an integral part of our daily lives, powering applications like facial recognition, self-driving cars, and personalized recommendations.

Continuous Evolution: The field of FFNs is constantly evolving, with researchers exploring new architectures, techniques, and applications.

PROJECT ON IDENTIFICATION OF NUMBERS USING FFN

https://colab.research.google.com/drive/14_0nEycLvfQT8BqjAC81ZopTZi1VS2lI?usp=sharing



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