SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution

Coimbatore-35

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade (Cycle-III)
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECT303-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

III YEAR/ V SEMESTER

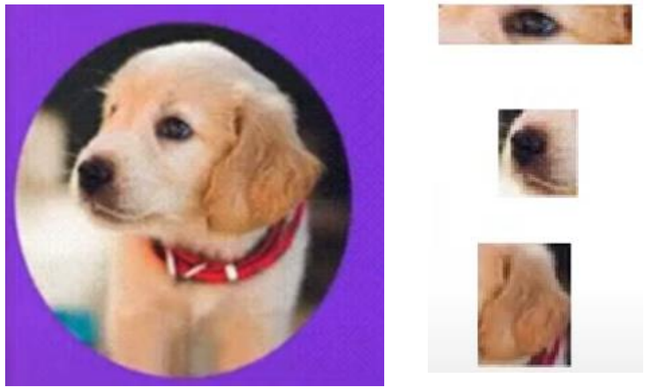
UNIT 1 – FUNDAMENTALS OF MACHINE LEARNING

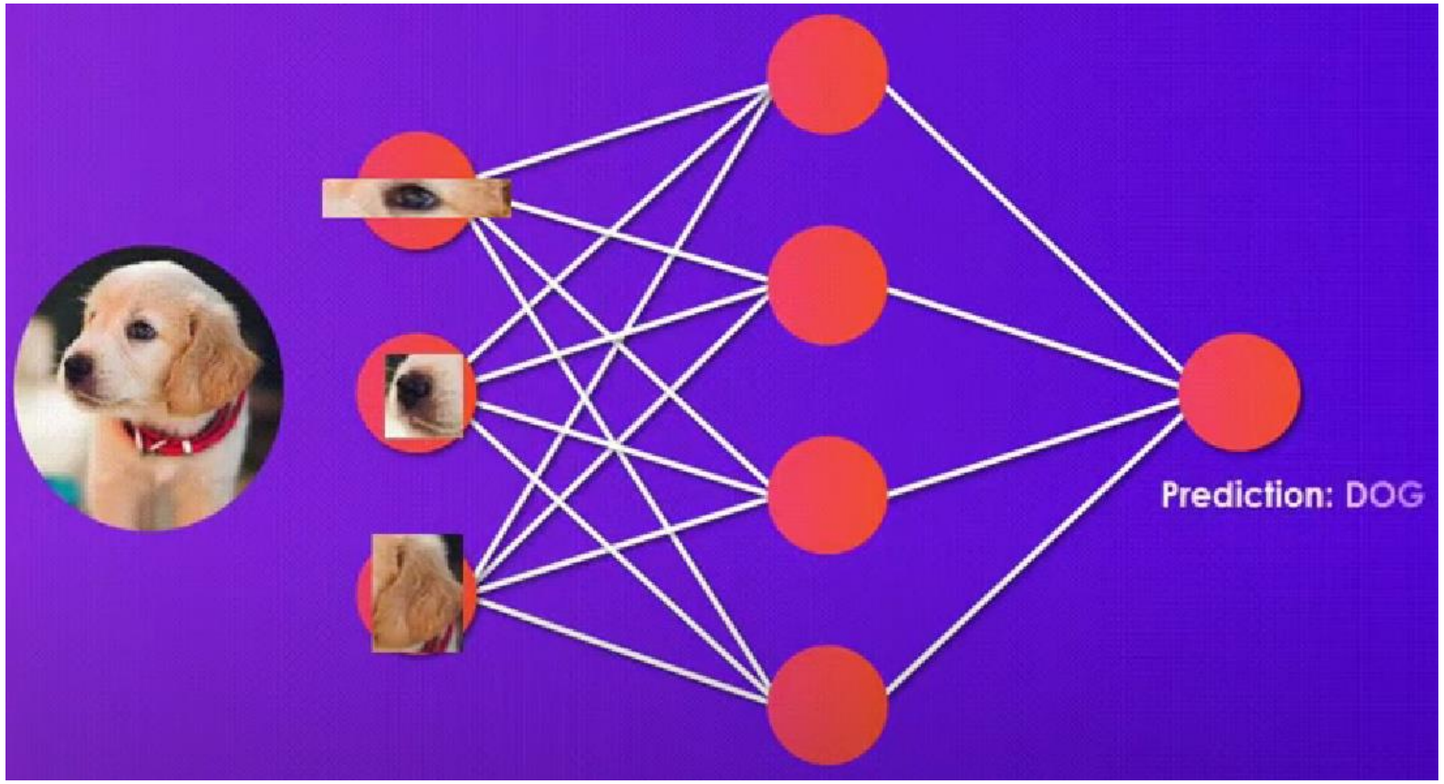
TOPIC – WEIGHT SPACE & CURSE OF DIMENSIONALITY

Weight Space

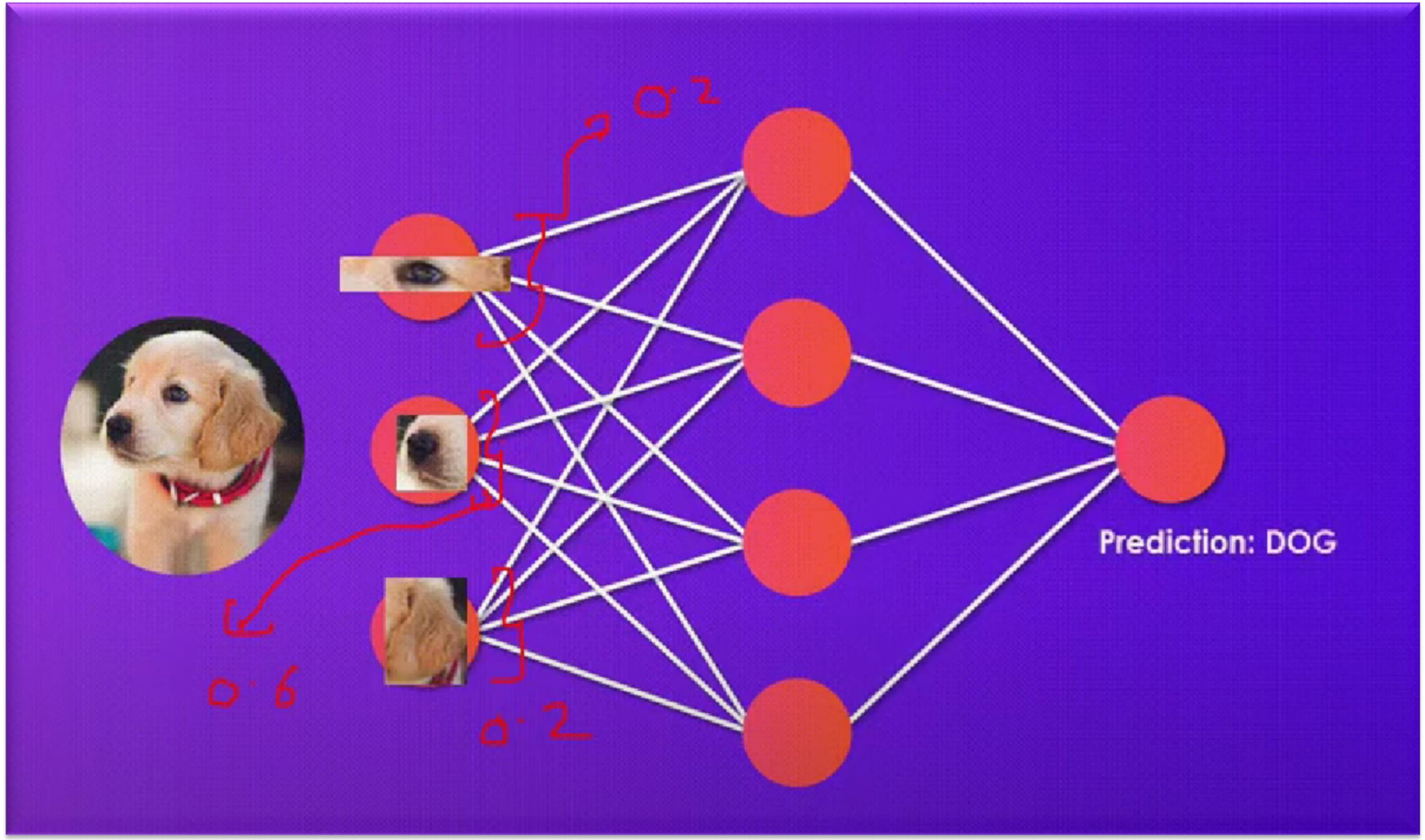
- Weight space (representation theory) Parameter space in artificial neural networks, where the parameters are weights on graph edges.
- Weight represents the strength of the connection between the units, a weight may bring down the importance of an input value or it may elevate.

Weight Space





Weight Space



Classroom Activity

Rebus puzzles
Can you guess the words and expressions?

M1Y L1I1F1E	Get it Get it Get it Get it	Try stand / 2
TRAVEL / ccccccc	FAST	T O W N
EYE EYE	father 	ONCE 
POT oo oo oo oo	D movie D movie D movie	SECRET  SECRET SECRET

Curse of Dimensionality

Curse of Dimensionality

- The Curse of Dimensionality (Features) in Machine Learning arises when working with high-dimensional data, leading to increased computational complexity, overfitting, and spurious correlations.
- Techniques like dimensionality reduction, feature selection, and careful model design are essential for mitigating its effects and improving algorithm performance.
- The Curse of Dimensionality refers to the phenomenon where the efficiency and effectiveness of algorithms deteriorate as the dimensionality of the data increases exponentially.

Curse of Dimensionality

- In high-dimensional spaces, data points become sparse, making it challenging to discern meaningful patterns or relationships due to the vast amount of data required to adequately sample the space.
- The Curse of Dimensionality significantly impacts machine learning algorithms in various ways. It leads to increased computational complexity, longer training times, and higher resource requirements. Moreover, it escalates the risk of overfitting and spurious correlations, hindering the algorithms' ability to generalize well to unseen data.

Curse of Dimensionality

House Price

Features (Dimensions):

- Size
- No. of rooms
- Location

After a threshold, the model will not give a much higher accuracy.

How to overcome the Curse of Dimensionality

Dimensionality Reduction Techniques:

Feature Selection:

Identify and select the most relevant features from the original dataset while discarding irrelevant or redundant ones. This reduces the dimensionality of the data, simplifying the model and improving its efficiency.

Feature Extraction:

Transform the original high-dimensional data into a lower-dimensional space by creating new features that capture the essential information. Techniques such as Principal Component Analysis (PCA) and t-distributed Stochastic Neighbor Embedding (t-SNE) are commonly used for feature extraction.

Assessment

Describe a Real time examples for the Curse of Dimensionality concept in detail.

THANK YOU