



# **SNS COLLEGE OF ENGINEERING**

**Kurumbapalayam (Po), Coimbatore – 641 107**

**An Autonomous Institution**

**Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A’ Grade**

**Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai**



**DEPARTMENT OF MANAGEMENT STUDIES**

**Subject Code & Name : 19BA336 - ARTIFICIAL INTELLIGENCE**

**Semester & Year : IV & II Year**

**Unit 3: CONVOLUTION NEURAL NETWORKS**

**Topic: CONVOLUTION NEURAL NETWORKS**



## Introduction to Image Classification

Image classification is a fundamental task in computer vision and involves categorizing images into predefined classes or labels. This process has a wide range of applications, from facial recognition and medical imaging to autonomous driving and retail analytics.



## Key Concepts in Image Classification

### Feature Extraction:

**Traditional Methods:** Historically, image classification relied on manual feature extraction techniques, such as edge detection, texture analysis, and color histograms.

**Deep Learning Methods:** Modern approaches use deep learning, particularly convolutional neural networks (CNNs), to automatically learn features from raw pixel data. CNNs can capture complex patterns and hierarchies of features directly from images.



## **Model Training:**

**Dataset:** The model is trained on a labeled dataset where each image is associated with a specific class. Common datasets include MNIST (handwritten digits), CIFAR-10 (object recognition), and ImageNet (large-scale visual recognition).

**Training Process:** The training process involves feeding images into the network, calculating the loss (difference between predicted and actual labels), and updating the network's weights through backpropagation to minimize the loss.



## Evaluation Metrics:

- Accuracy: The percentage of correctly classified images.
- Precision and Recall: Metrics that provide more insight into the performance on specific classes, especially useful in imbalanced datasets.
- Confusion Matrix: A table that visualizes the performance of the model by showing the true versus predicted classifications.





## Applications of Alternative Data

**Investment Strategies:** Hedge funds and asset managers use alternative data to gain competitive advantages in identifying investment opportunities, predicting stock prices, and assessing market sentiment.

**Risk Management:** Financial institutions analyze alternative data to manage risks, detect fraud, and improve credit scoring models.

**Business Intelligence:** Companies leverage alternative data to optimize supply chains, enhance customer experiences, and refine marketing strategies.

**Economic Analysis:** Economists use alternative data to track economic indicators, forecast economic trends, and monitor the impact of policy changes.



## Steps in Image Classification

Data Collection and Preprocessing

Model Architecture Selection

Training the Model

Model Evaluation and Testing

Deployment



## **Applications of Image Classification**

1. Healthcare: Diagnosing diseases from medical images (e.g., detecting tumors in X-rays and MRIs).
2. Autonomous Vehicles: Identifying objects on the road, such as pedestrians, vehicles, and traffic signs.
3. Retail: Analyzing customer behavior through in-store cameras and managing inventory with automated product recognition.
4. Social Media: Tagging and organizing images based on content, such as faces, objects, and scenes.
5. Security: Facial recognition for access control and surveillance.





Thank  
you