

# Deep Learning Neural Networks Explained: ANN, CNN, RNN, and Transformers

Deep learning is at the heart of modern Artificial intelligence. From image recognition to language translation, neural networks power most of the AI applications we use today.

In this article, we'll break down the four major types of neural networks—ANN, CNN, RNN, and Transformers.

## Artificial Neural Network (ANN)

### What it is:

- An Artificial Neural Network is the most basic type of neural networks

### Best for:

- Classification problems  
Spam email detection
- Handwritten digit recognition
- Disease prediction  
Predicting houses prices  
Weather prediction

- ✓ Key idea, ANN work best when the data is structured (numbers, categories).

## Convolutional Neural Network (CNN)

### What it is:

- CNNs are designed to process image and video data, Uses convolutional layers to extract features like edges,

### Applications:

- Image classification (cat vs. dog)
- Object detection (detecting cars, people)
- image segmentation (separating object from background)
- Video analysis

### Popular architectures:

- RCNN, Fast RCNN, Faster RCNN  
Mask RCNN — used for object detection and segmentation

## Recurrent Neural Network (RNN)

### What it is:

- RNNs are a doger for sequential data where order matters (e.g. text, speech, time-series) unlike ANN and CNN

### Applications:

- Natural Language Processing (NLP) (text generation, translation)
- Speech recognition
- Time-series forecasting (stock prices, sensor data)

## Transformers

### What it is:

- Transformers replaced RNNs in modern NLP tasks, using an attention mechanism instead of recurrence making them more powerful and scalable
- **Advantages:** Parse long sequences efficiently ✓ Work in parallel faster training than RNN-
- Captures long-range dependencies in text
- ✓ **Famous Models:** BERT for classification, question answering, sentiment analysis

# Exercise Neural Networks And Deep Learning

**AW Chickering**



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