What is Deep Learning?

Deep learning is a type of machine learning inspired by the human brain. It learns from large amounts of data and powers many technologies you use every day.

by Samy Bravy

The Basic Building Block: The Neuron

Neuron Structure

Deep learning uses artificial neurons, or nodes. Each neuron receives inputs, processes them, and produces an output.

Weight & Bias

Weights and biases determine the strength of connections between neurons.

Activation Function

The activation function decides if a neuron "fires" based on the processed input.

Neural Networks: Neurons Working Together

Input Layer

Receives initial data (e.g., image pixels).

Hidden Layers

Perform complex computations on data.

Output Layer

Produces final result (e.g., classification).

How Deep Learning Learns: Training

1 ## Prediction

The model makes predictions based on input data.

2 ## Comparison

Predictions are compared to the correct values.

3 ## Adjustment

An algorithm adjusts the model's weights and biases.

4 ## Iteration

The process repeats iteratively with more data.
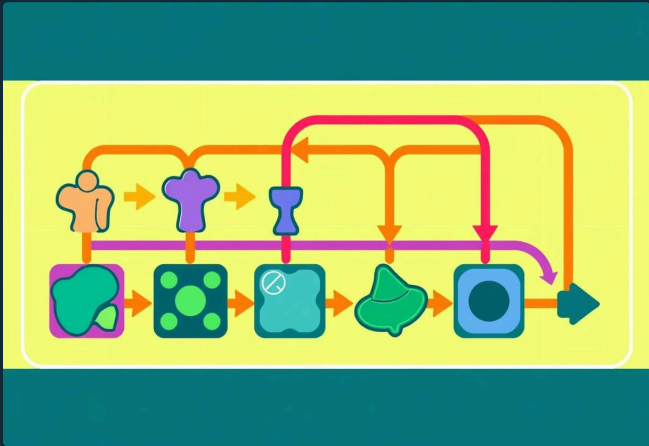
Deep Learning vs. Traditional Machine Learning

Traditional Machine Learning

Requires manual feature extraction.
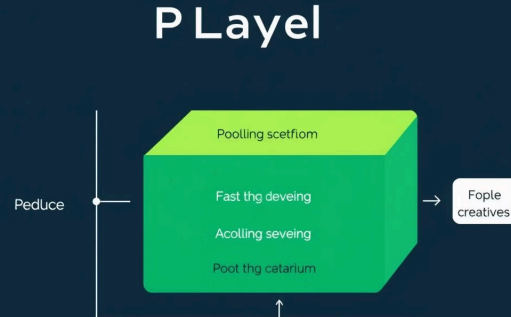
Deep Learning

Automatically learns features from raw data.

Convolutional Neural Networks (CNNs) for Images

Convolutional Layers

CNNs use convolutional layers to detect patterns.

Pooling Layers

Pooling layers reduce the size of the data and computation.

Applications

Used in image recognition, object detection, and image generation.

Example: Image Classification with Deep Learning
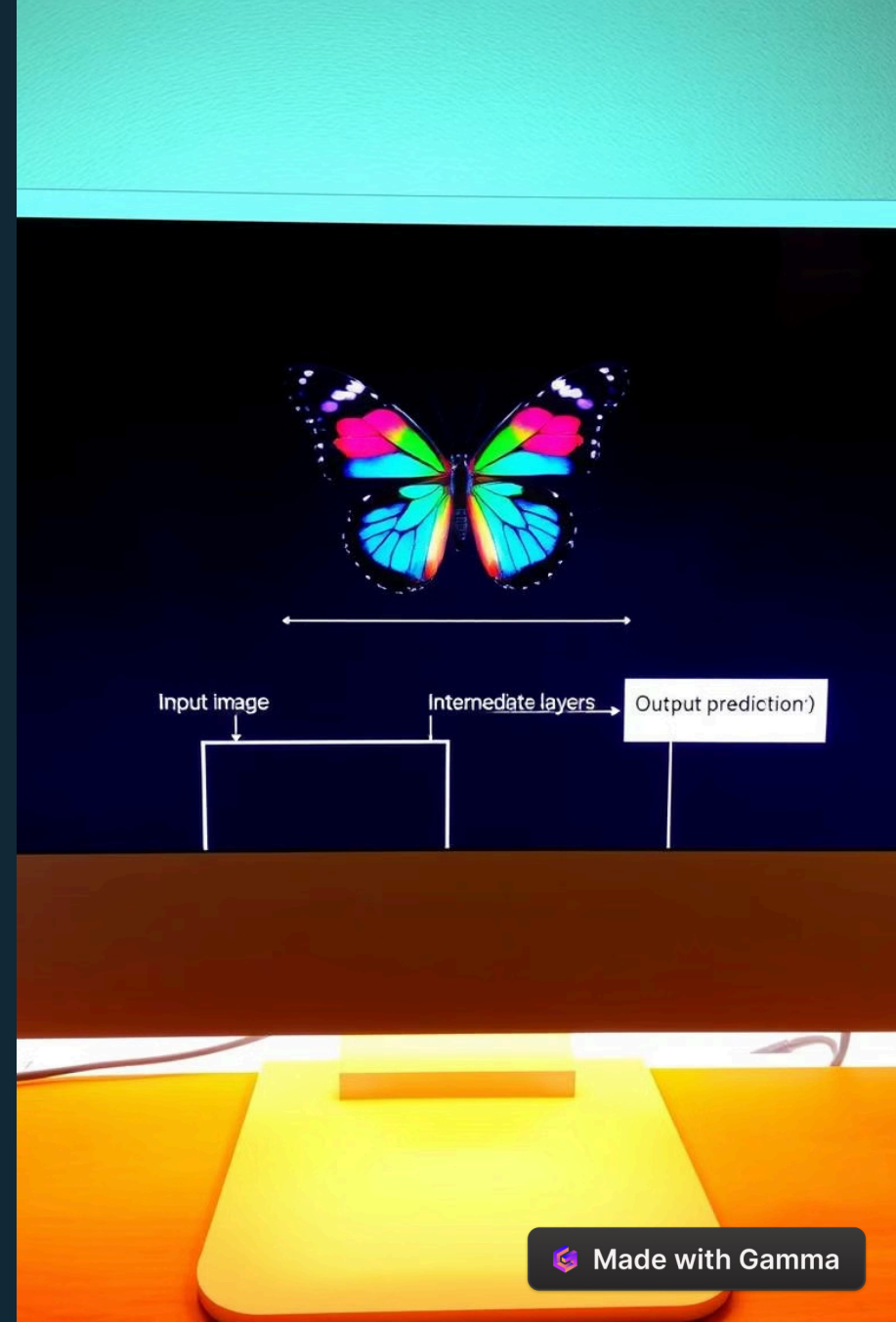
1 Input: An image of a handwritten digit (0-9).

2 The CNN processes the image and extracts features.

3 Output: The model predicts the digit.

Input image   Intermedate layers   Output prediction')

Deep Learning in the Real World

Self-driving cars.

Medical diagnosis.

Virtual assistants (Siri, Alexa).

Fraud detection.