Seizure Detection Using EEG Data

Presentation by Yaksh and Prince
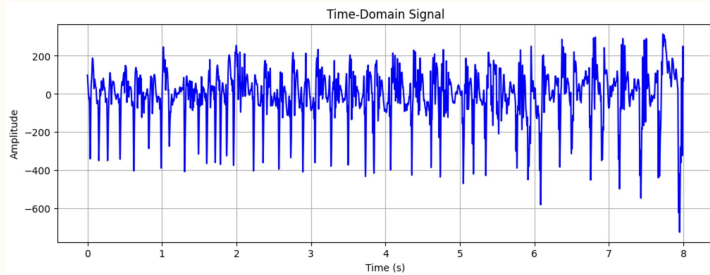
Table of Contents
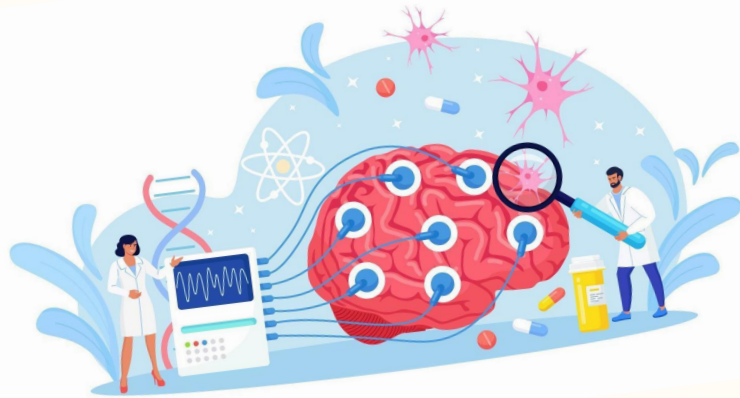
Challenge of interpreting EEG signals

- Time Consuming Manually
- Prone to error
- No systematic framework

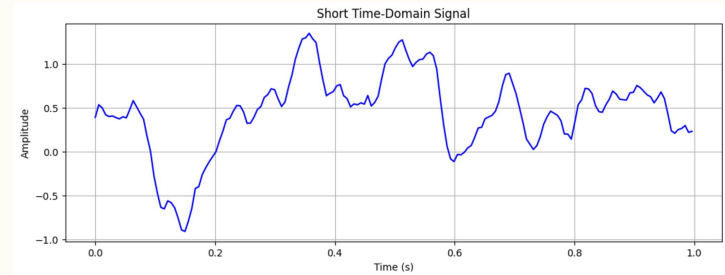# Dataset Overview

Full Signals

-   Total Number of Signals: 500
-   400 Seizures and 100 Non Seizures

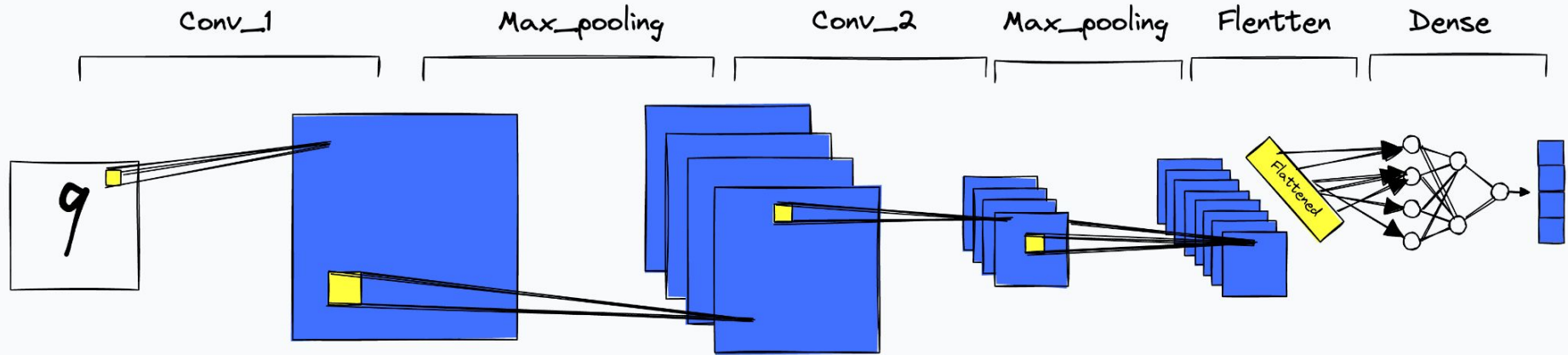**Full Signal Seizure Sample**

Short Signals

-   Total Number of Signals: 11500
-   2300 Seizures and 9200 Non Seizures

Short Signal No Seizure Sample

Our Algorithm

Convolutional Neural Networks (CNN)- Sequential

What is CNN?

The core component of a CNN is convolution, which allows it to capture local patterns, such as signal cycles, and helps in extracting relevant information from the input.
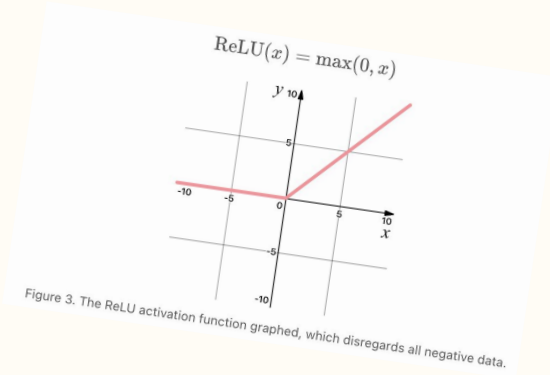
CNN can handle translation invariance.

Model Architecture - Core Concepts

Activation Functions

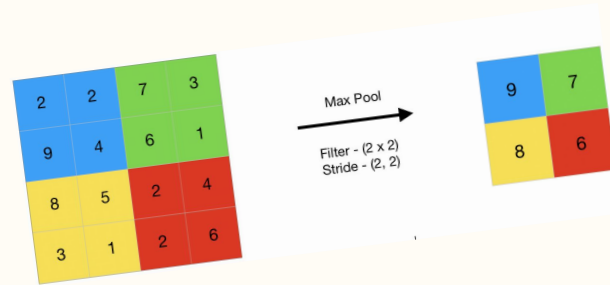ReLU acts as a switch for non-linear relationships.
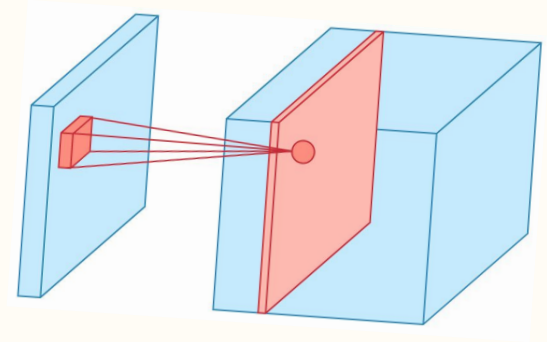
Softmax allows for proper decision making.

Pooling Layers

Extracts Key Features in the "Big Picture"

Convolution Layers

Identifies the smaller details and converts to a feature map

$$ReLU(x) = \max(0, x)$$

Figure 3. The ReLU activation function graphed, which disregards all negative data.

Max Pool

Filter - (2 x 2)
Stride - (2, 2)

Training Parameters - Short Signals

90% train data, 5% validation data, 5% test data

Pool Size = 2, Kernel Size = 3, Filters = 64, 128 Neurons

Categorical Cross Entropy Loss Function and Adam Optimizer

Batch Size = 16, Epochs = 6, Patience = 5

Training Parameters - Full Signals

80% train data, 10% validation data, 10% test data

Pool Size = 2, Kernel Size = 3, Filters = 64, 128 Neurons

Categorical Cross Entropy Loss Function and Adam Optimizer

Batch Size = 32, Epochs = 12, Patience = 5

Results

Short Signals

90% train data, 5% validation data, 5% test data

Actual		Predicted	
		NS	S
	NS	459	1
	S	2	113

Accuracy: 99%

Full Signals

80% train data, 10% validation data, 10% test data

Actual		Predicted	
		NS	S
	NS	37	3
	S	2	8

Accuracy: 90%

Code Go Through

Thank you!

We are now open to questions.