INTRODUCING DEEP LEARNING PLANT HEALTH MONITORING

USING SENSORS

The need for Plant Health Monitoring

- Plant disease and pests

Natural disasters such as plant diseases and pests can adversely affect the normal growth of plants and may even result in plant death during the entire plant's growth cycle.

- Plant water stress

Plant productivity is threatened by water stress, also known as drought stress. In most major crop plants, water availability can reduce yields by more than half.

Why Deep learning ?

1 What is Deep Learning ?

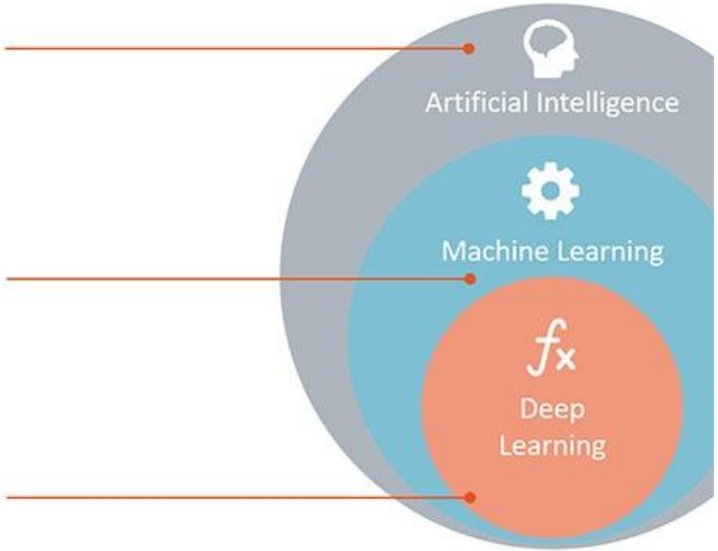
2 Compare Deep Learning

What is Deep learning ?

Artificial Intelligence
Any technique which enables computers to mimic human behavior.

Machine Learning
Subset of AI techniques which use statistical methods to enable machines to improve with experiences.

Deep Learning
Subset of ML which make the computation of multi-layer neural networks feasible.

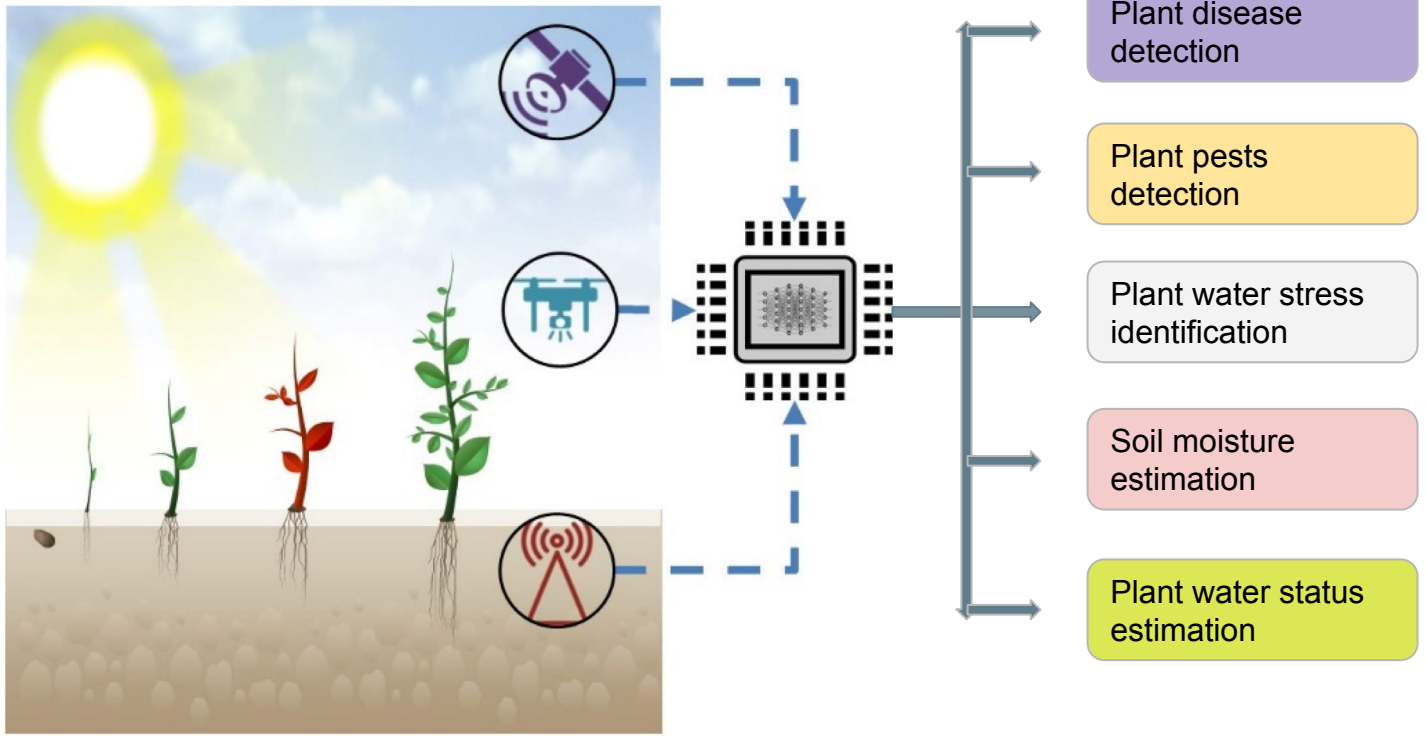


WHAT MAKES DEEP LEARNING DIFFERENT ?

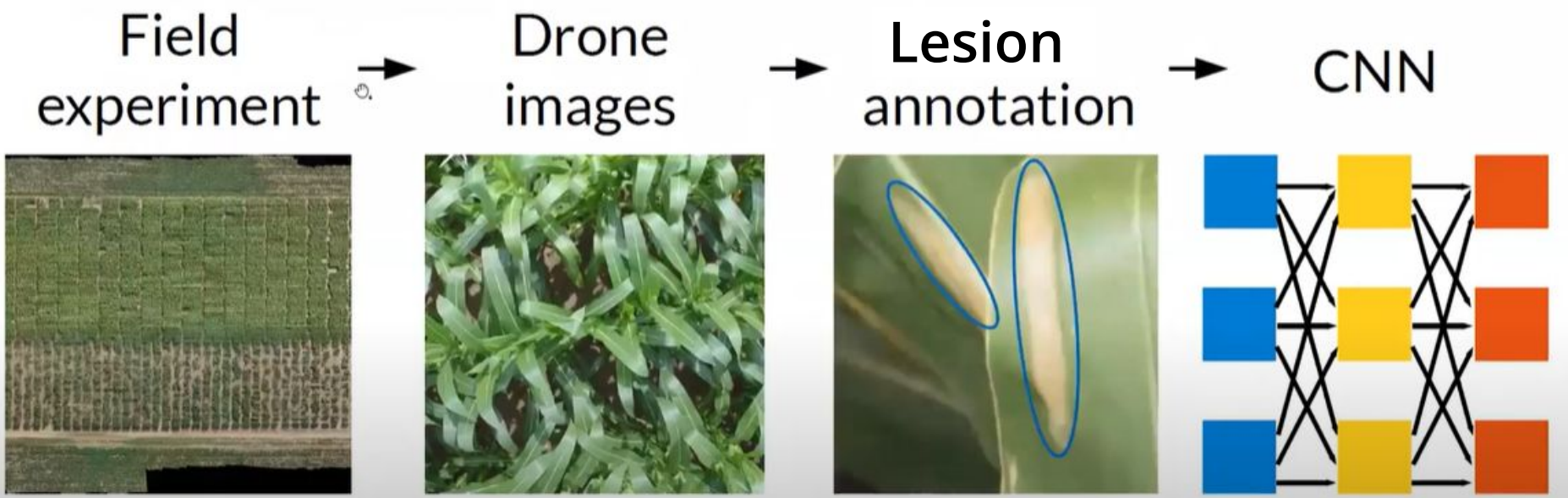
- ## TRADITIONAL PLANT DISEASES AND PESTS DETECTION METHODs

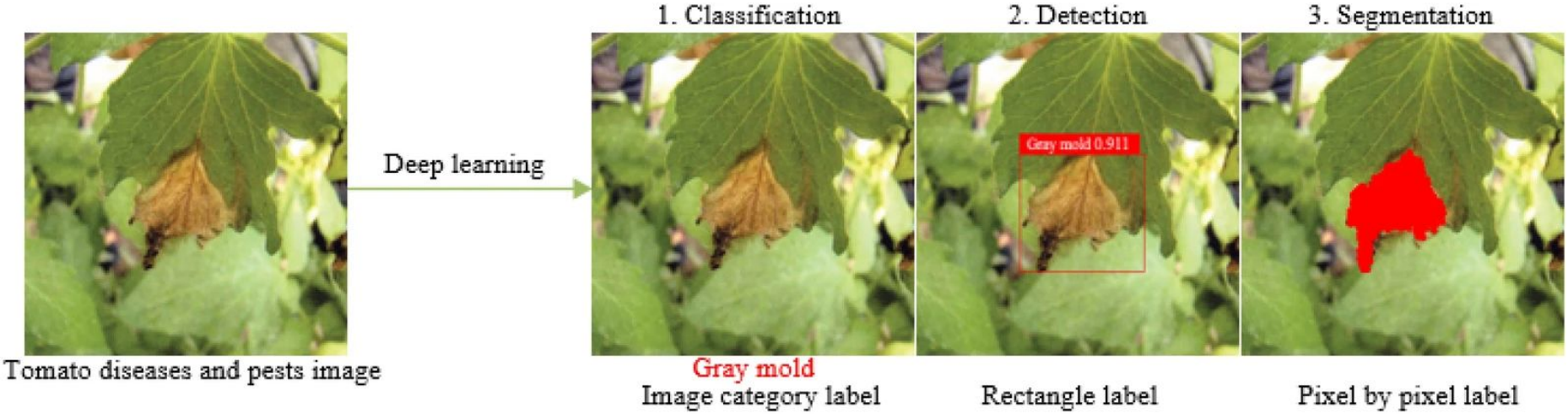
The traditional method of detecting plant diseases and pests is to identify them manually by designing features, and that's hard and depends on experience and luck, and is not capable of learning and extracting features automatically. Deep learning, on the other hand, can automatically identify features from large sets of data without the need to manually manipulate them.

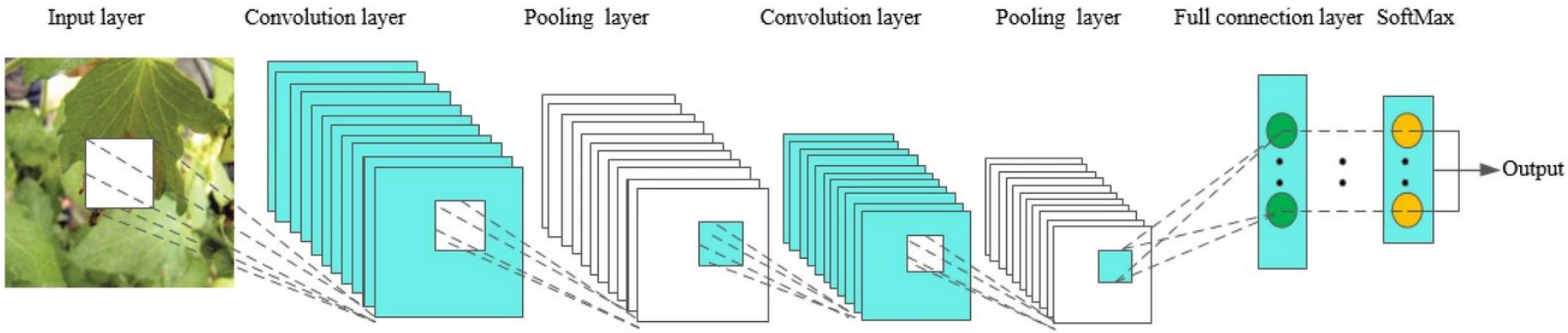
Sensory System



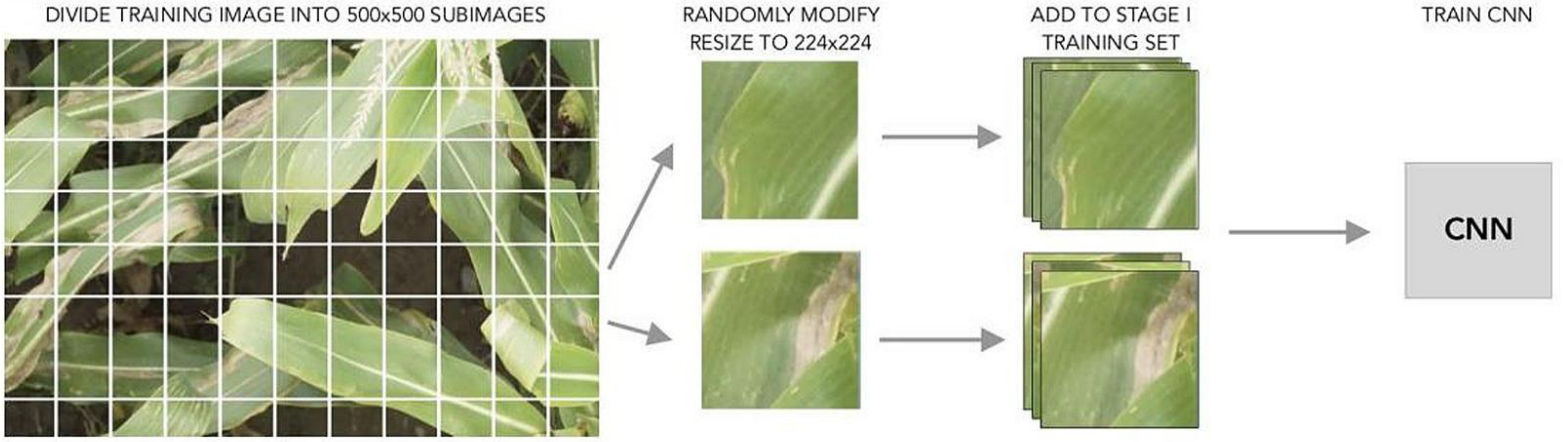
UAV System



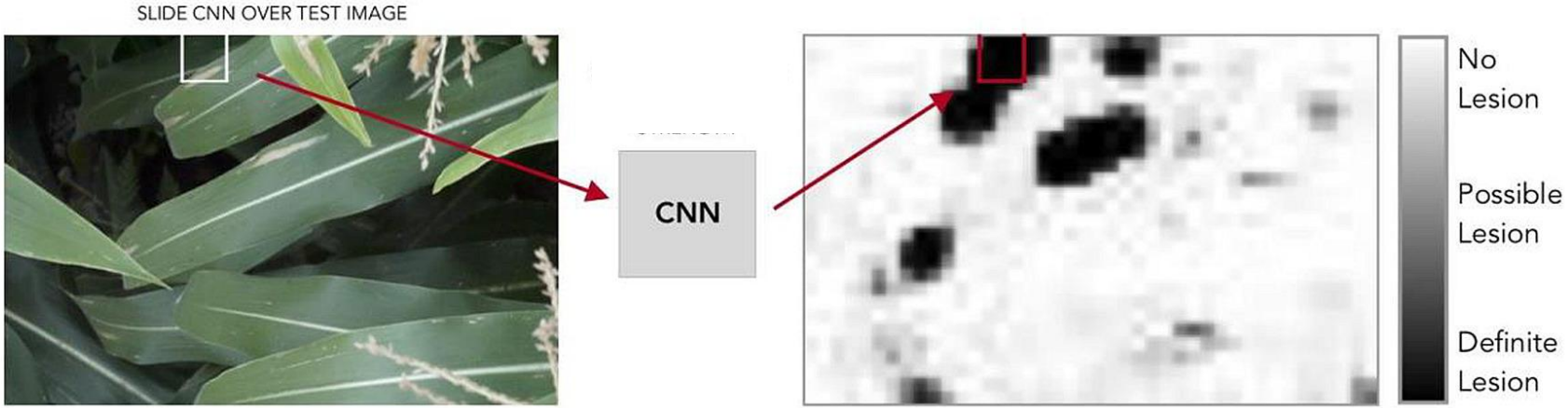

1. Classification
2. Detection
3. Segmentation
Deep learning
Gray mold 0.911
Tomato diseases and pests image
Gray mold
Image category label
Rectangle label
Pixel by pixel label


Input layer
Convolution layer
Pooling layer
Convolution layer
Pooling layer
Full connection layer
SoftMax
Output

STAGE ONE



STAGE TWO



Plant Water Stress

The proposed solution is tested for a smart irrigation system, where a physical sensor is replaced by a neural sensor.

Physical sensors

- Temperature
- Humidity, and
- Soil moisture data

to calculate the transpiration in a particular field.

Plant Water Stress

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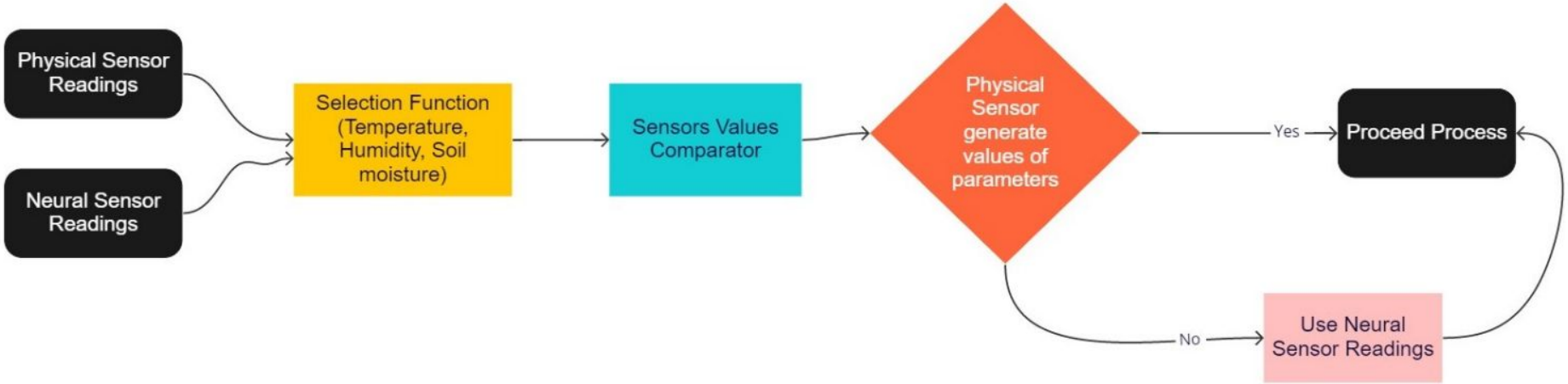
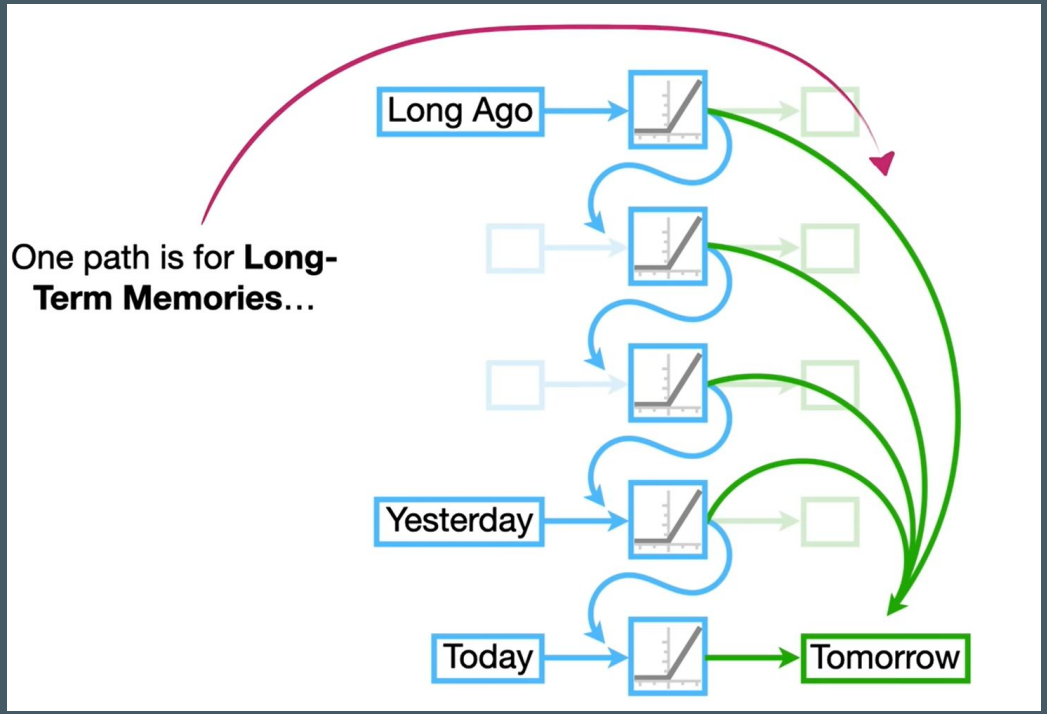


Implementation

Since our data is sequential in nature with long-term dependencies, we decided to choose the Long Short-Term Memory (LSTM) architecture. The training of a neural sensor with the help of a recurrent neural network (LSTM).

The main idea behind how **Long Short-Term Memory (LSTM)** works…



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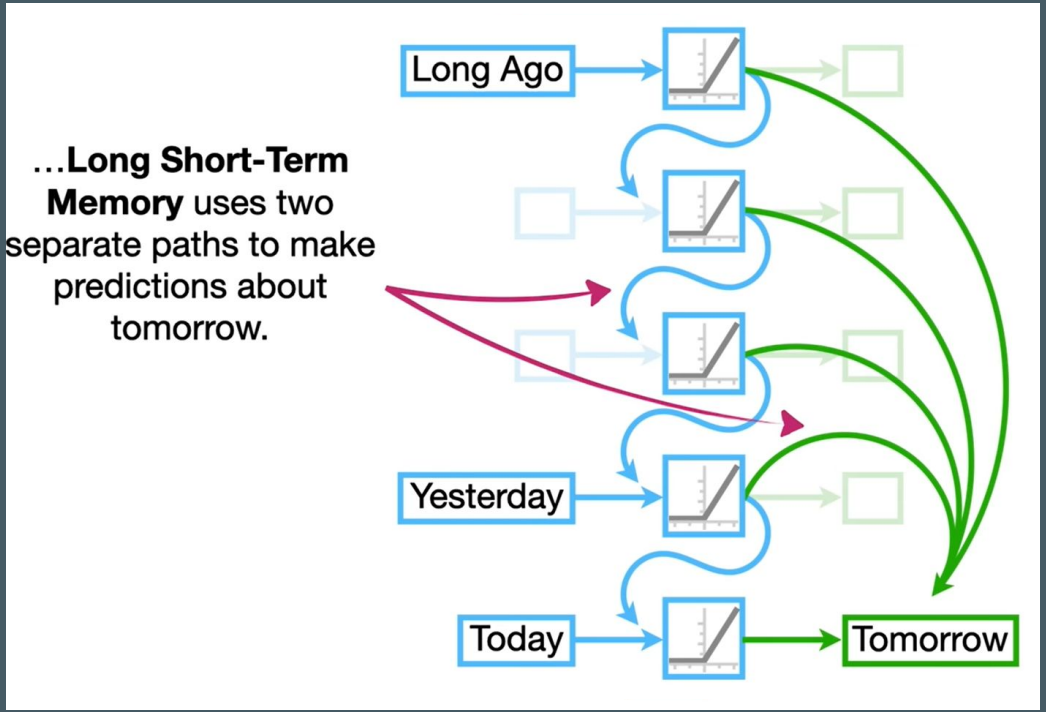

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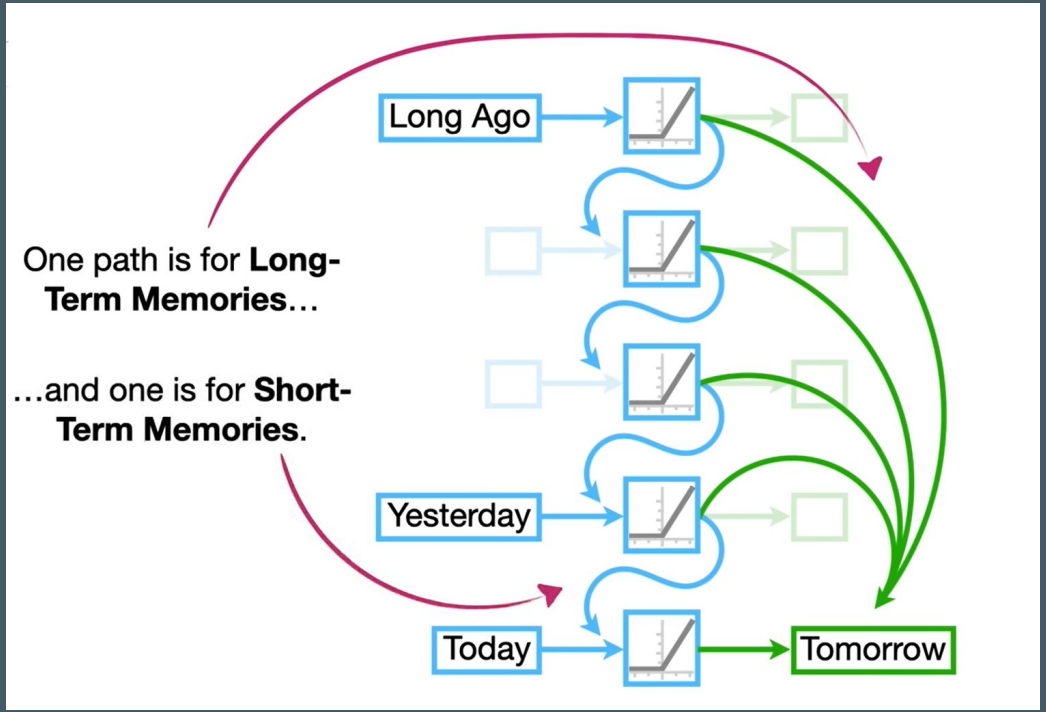

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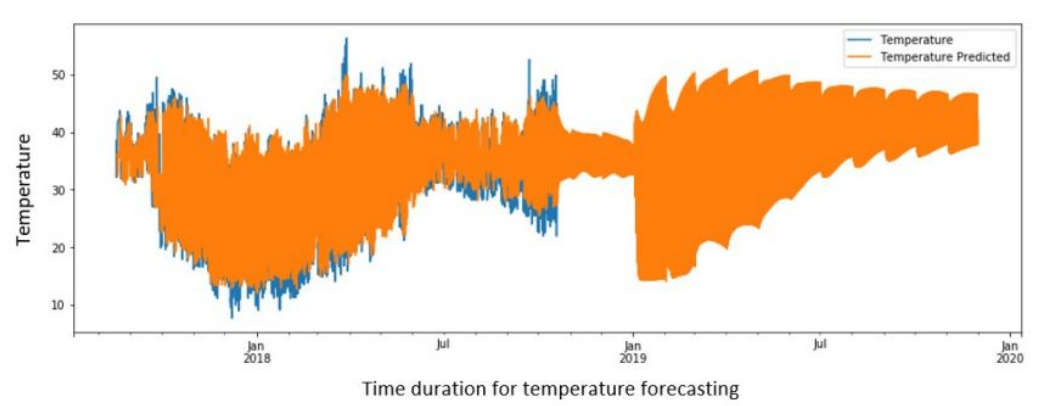

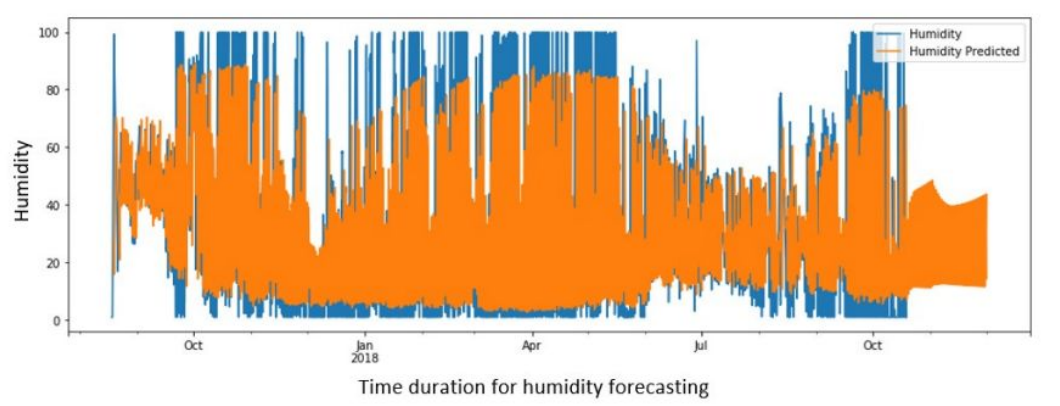

Thank you....