

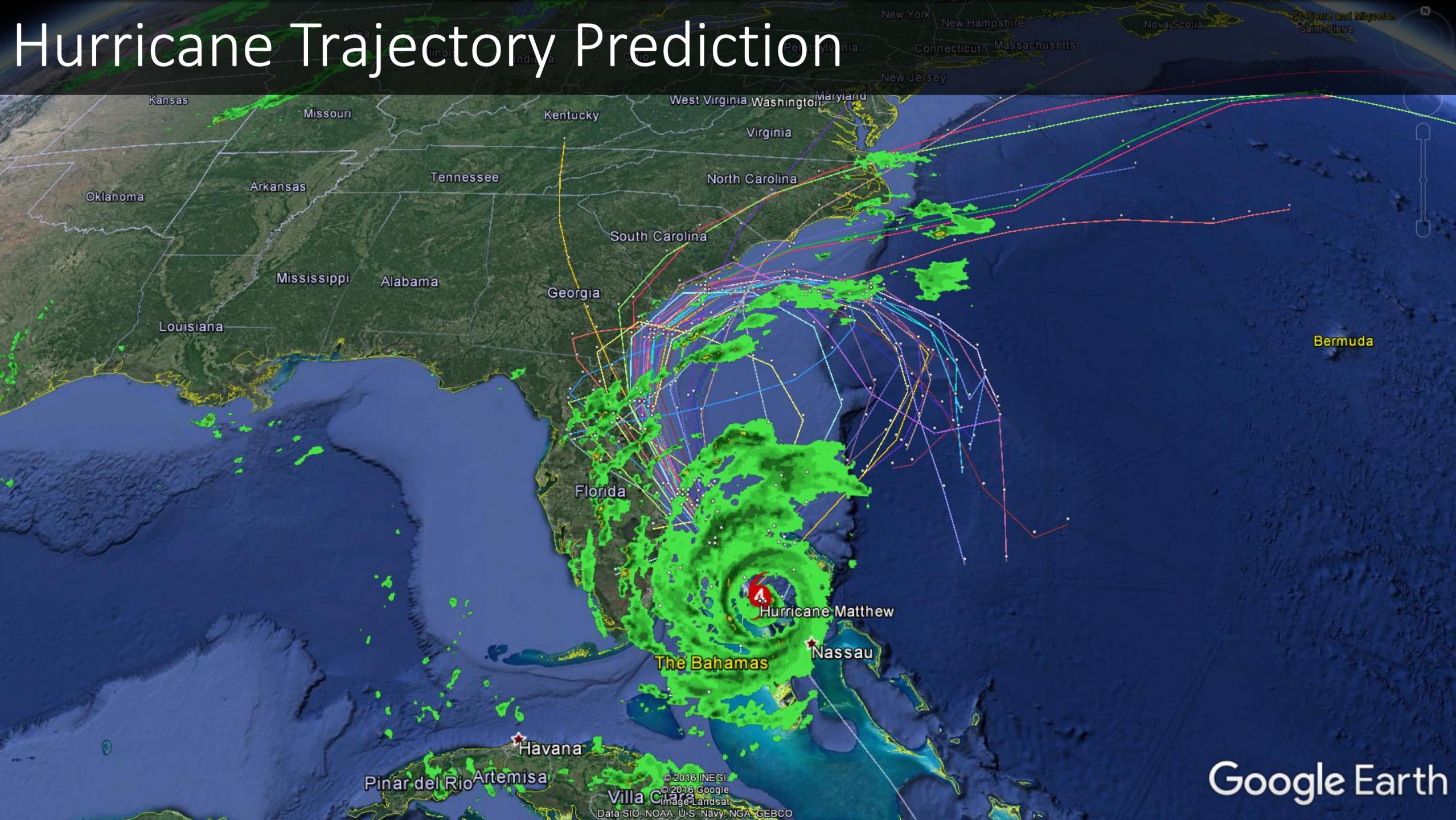
Deeper Insights

Developing a Deep Learning Algorithm for Climate Change Prediction

The Problem

According to the Department of Civil Engineering and Environmental Sciences at LMU, climate change projections continue to be dominated by large uncertainties.

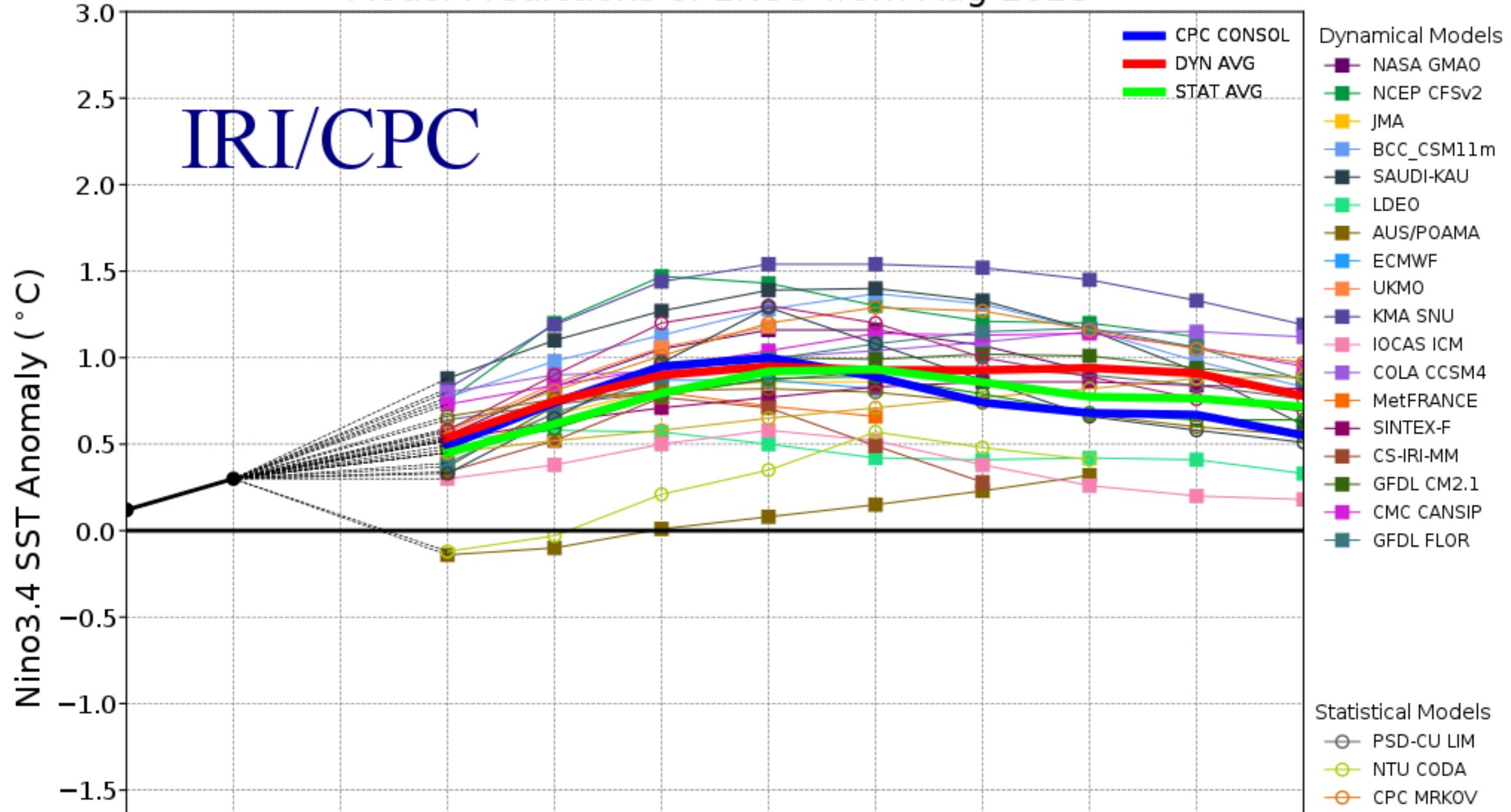
- Complex dynamic models
- Outdated statistical models
- Computationally inefficient “ensemble methods”



Google Earth

Predicting El Niño

Model Predictions of ENSO from Aug 2018



The Solution

Thanks to recent research in the field of Artificial Intelligence, in particular the success of Deep Learning algorithms to take advantage of big data, combined with the availability of Earth observations from space and from the ground, breakthroughs appear to be within reach.

- Deep Learning Algorithms
- High availability of data
- Cheap accessibility to cloud computing

Goals

- Harness the power of big data
- Defeat the accuracy of currently used statistical and dynamical models
- Produce an algorithm that is fast and simple

Justification

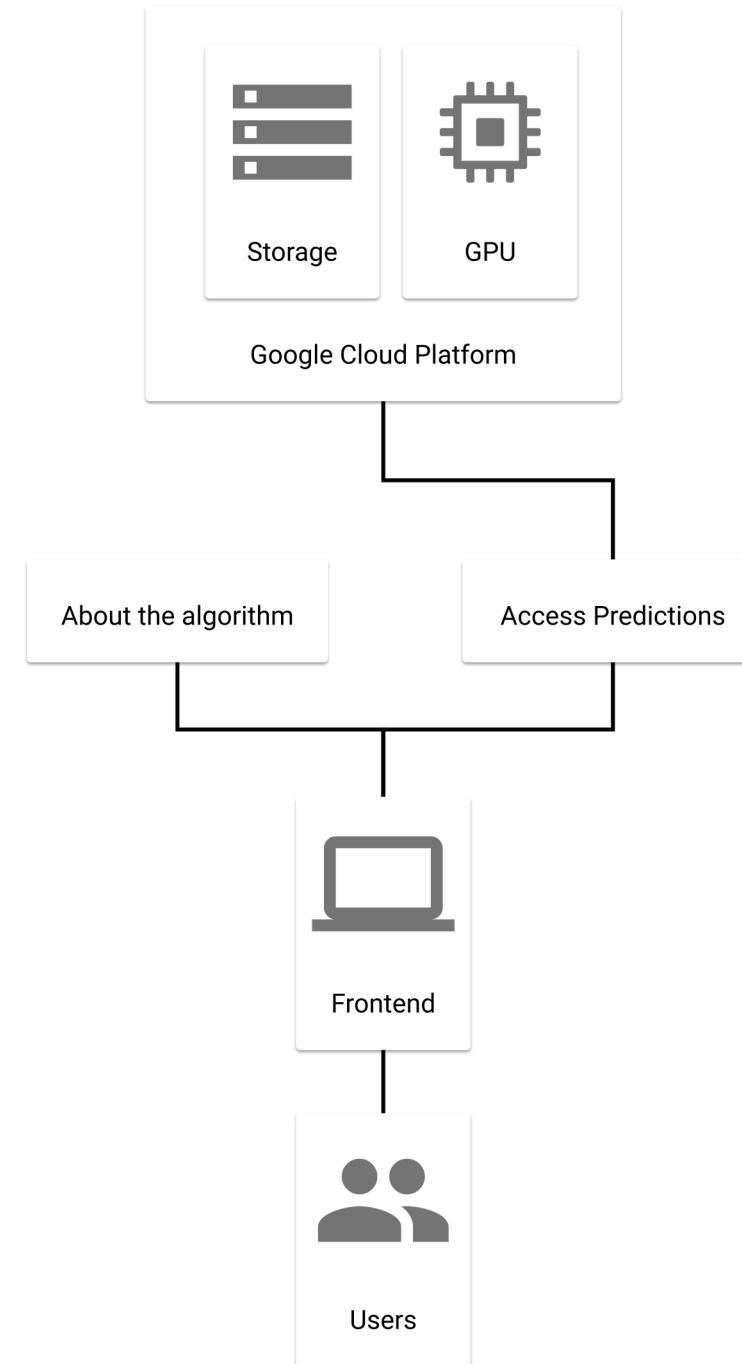
We are interested in this project because:

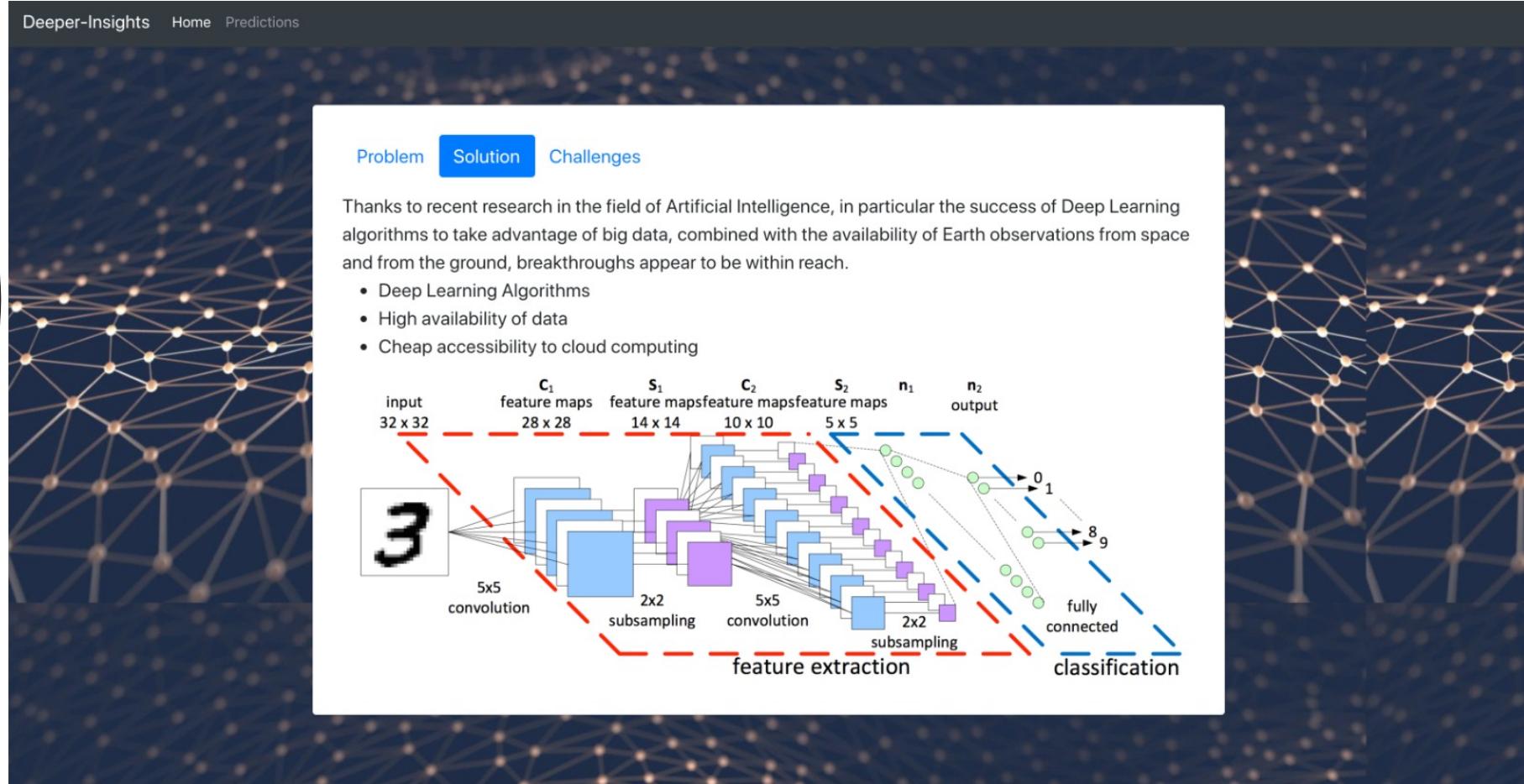
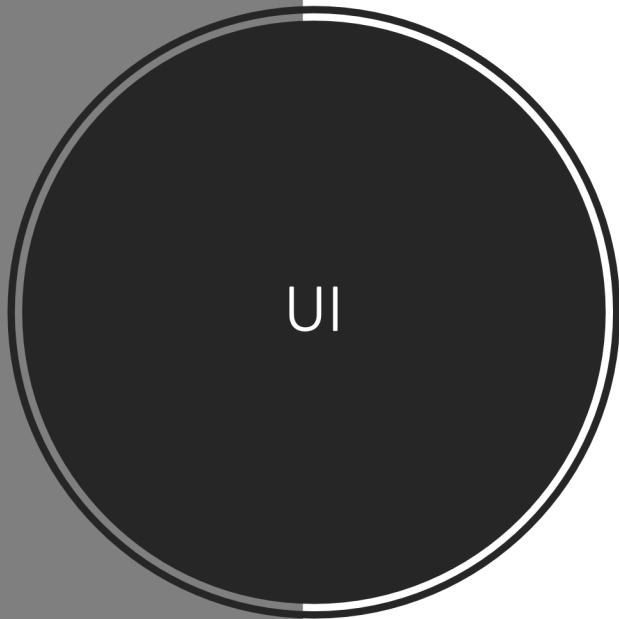
- Passion for data science
- Climate change social justice (raise awareness)

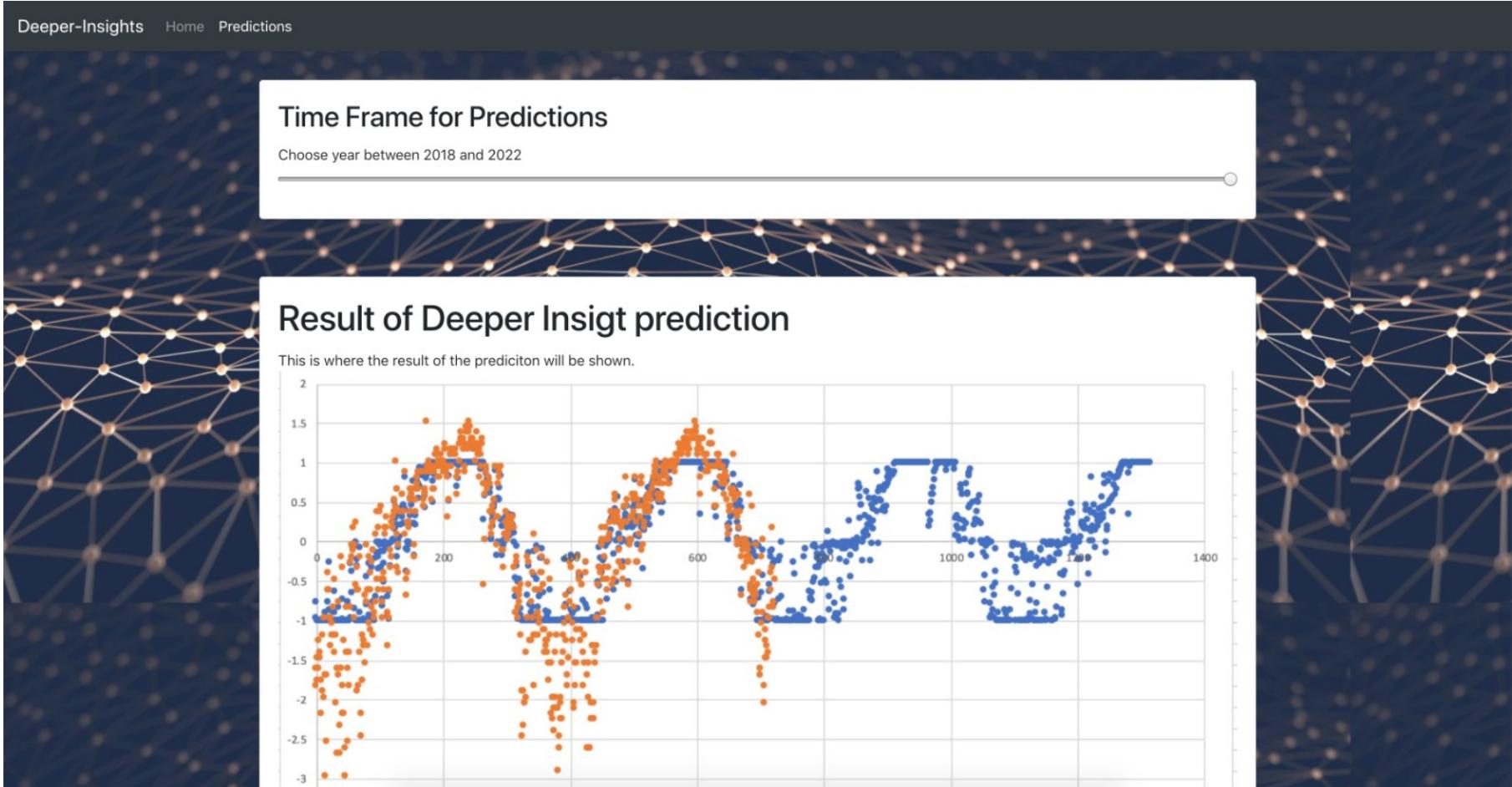
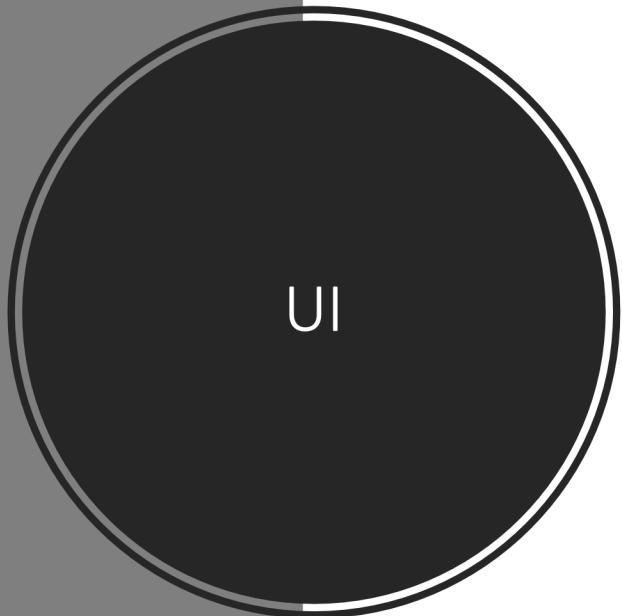
We are able to perform this project because:

- Math interests and abilities
- Previous experience with Big Data and Machine Learning

Use Case diagram







The Training Data

Features (inputs):

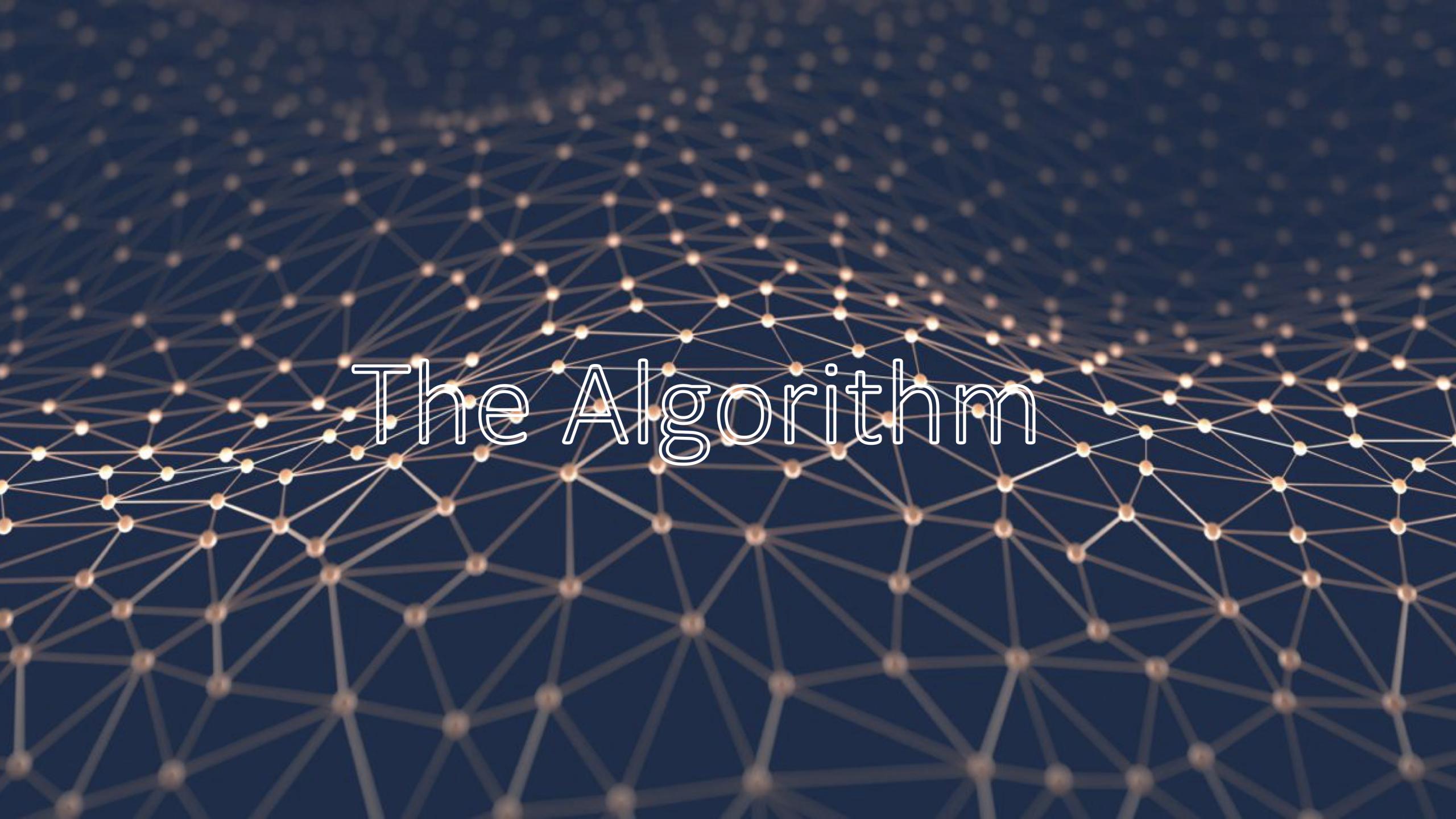
- Latitude
- Longitude
- Zonal Winds
- Meridional Winds
- Humidity Air Temperature

Labels (outputs):

- Sea Surface Temperature

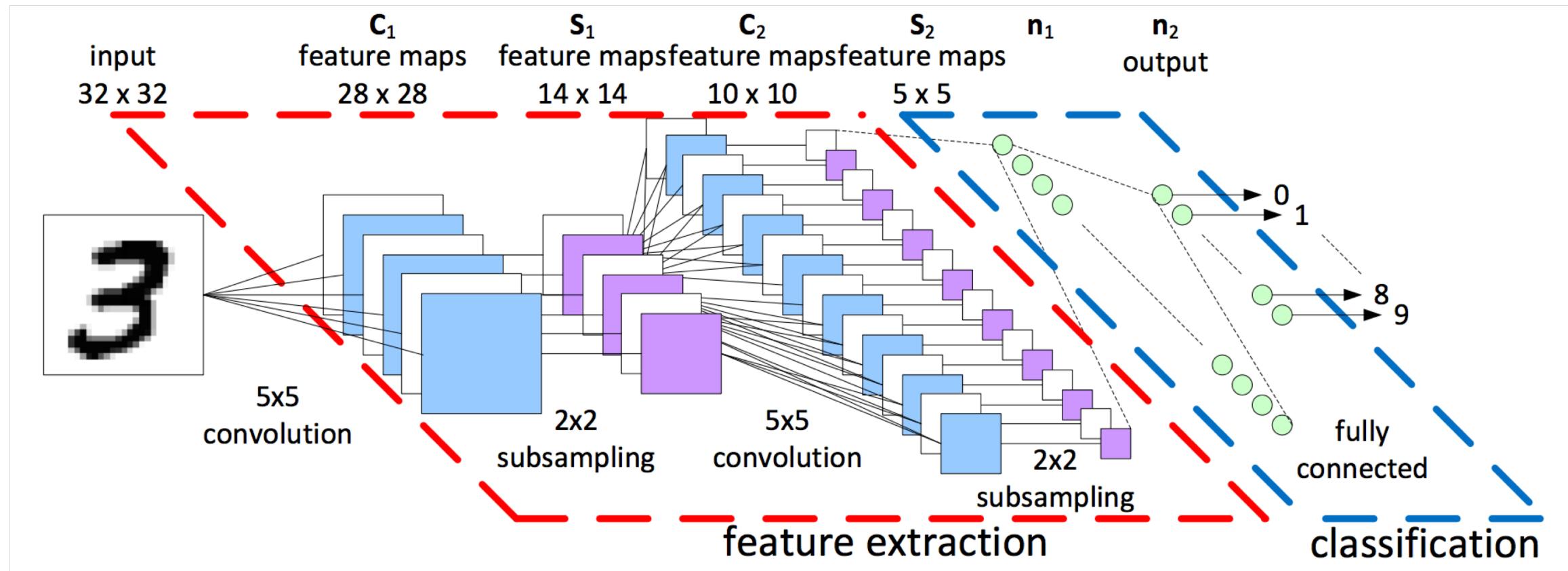
Data range of time: 1980-1990

Missing values: yes

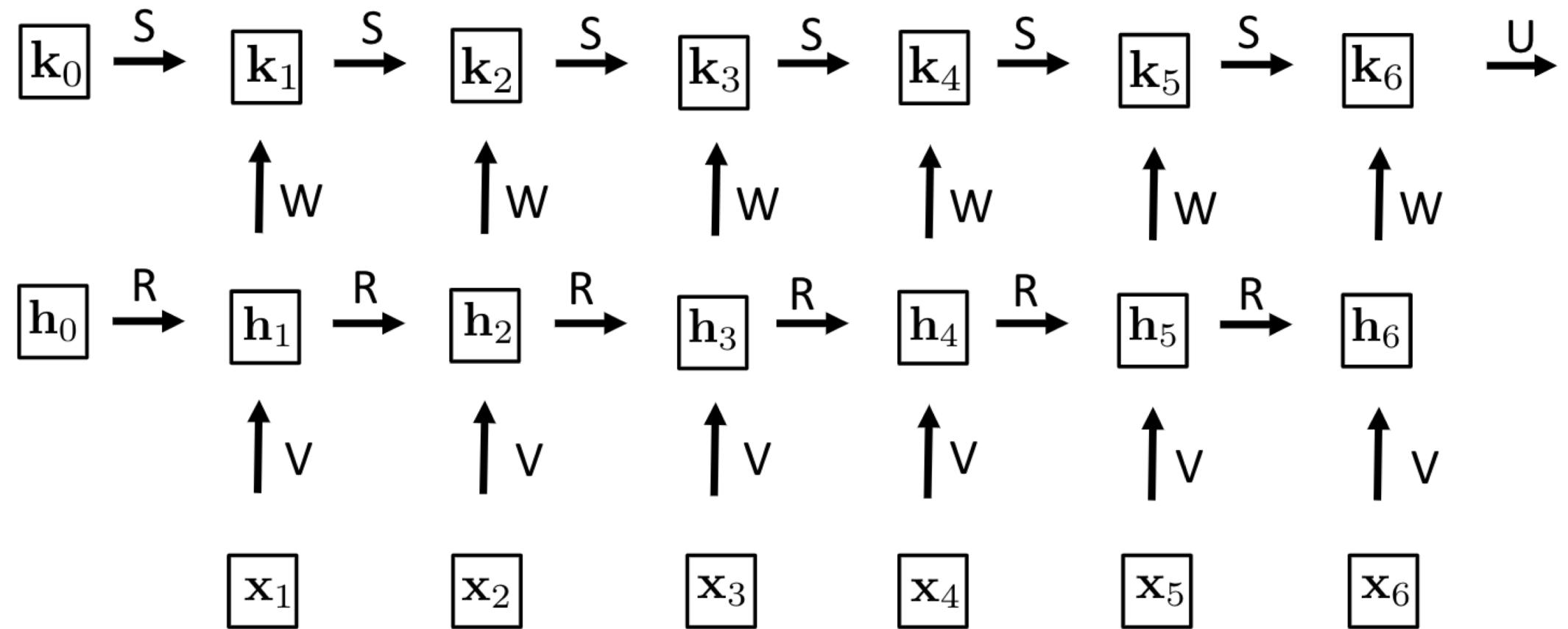


The Algorithm

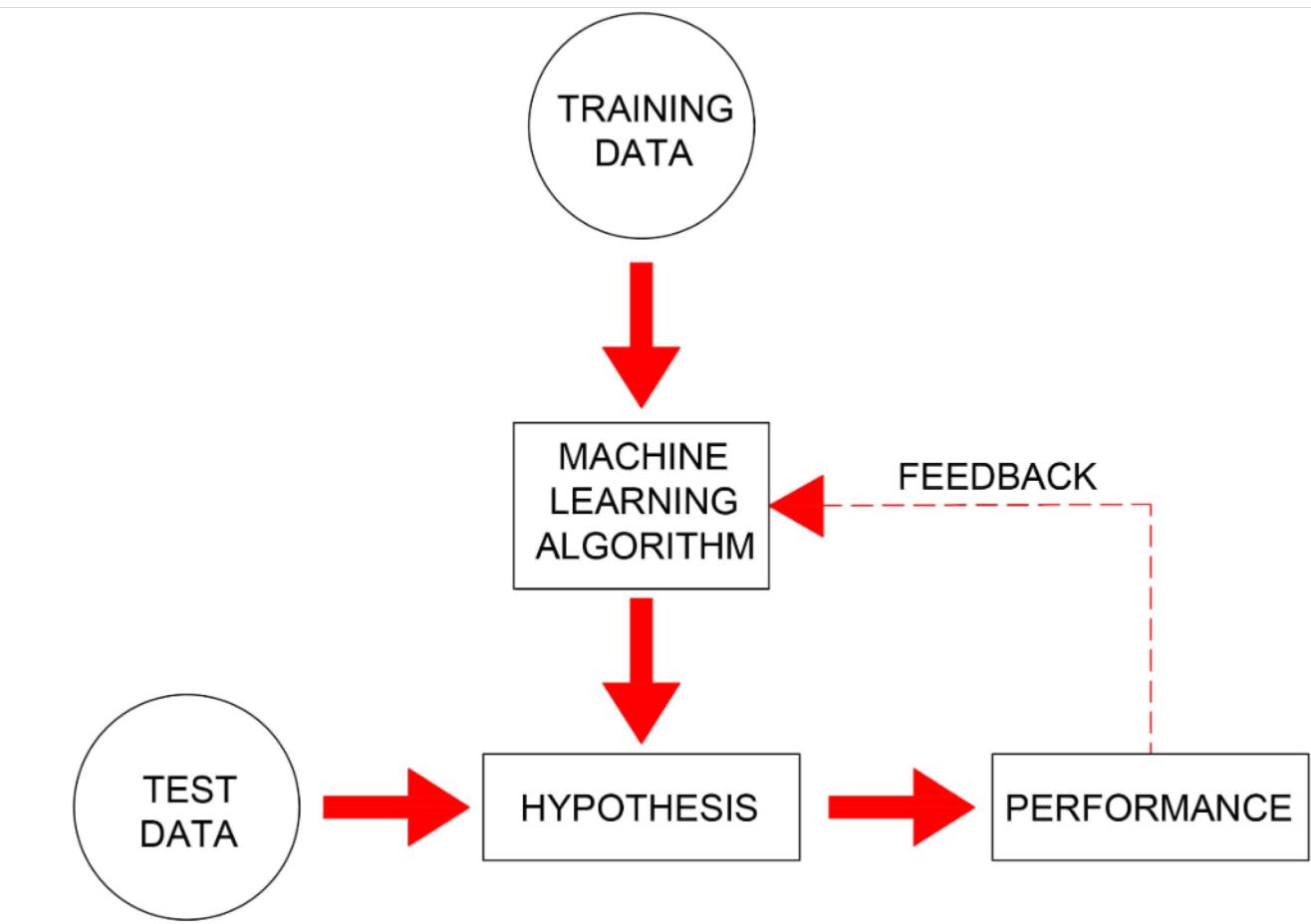
Convolutional Neural Networks



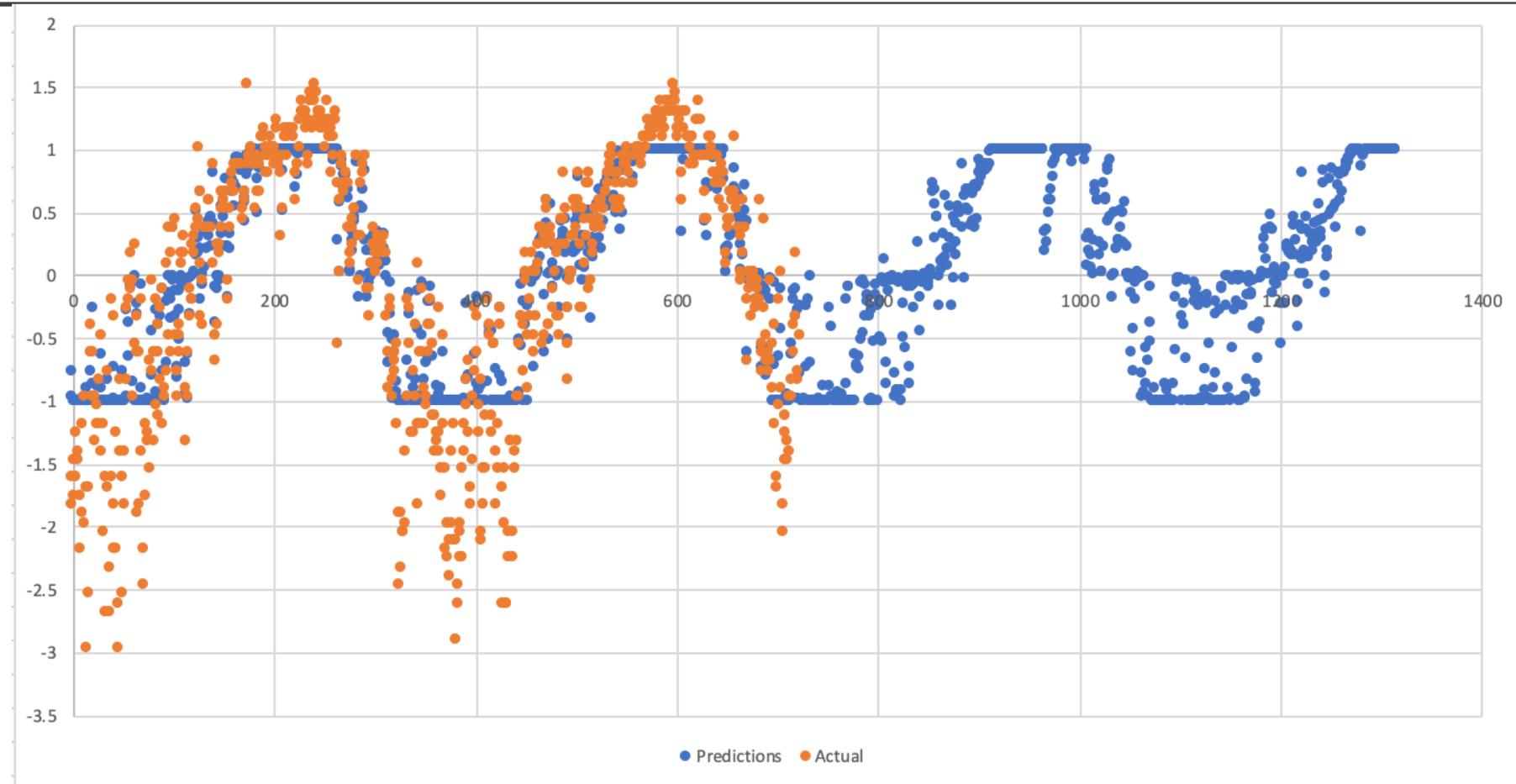
LSTM Networks



Pipeline:



Prediction Results:



Challenges

- Data quality
- Number of features
- Area covered by data (will not work in the entire world)
- Environmental engineering knowledge limitation

Status update:

What we have done:

- Finished the algorithm got 14% accuracy
- Finished Front end
- Algorithm is running on Google Cloud

What we will do:

- Try to achieve better accuracy



Thank you!
Questions?