

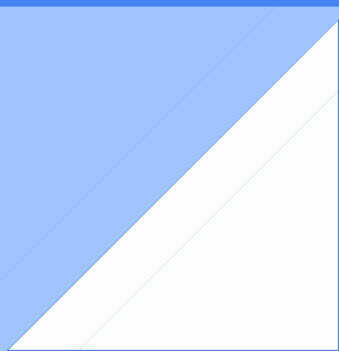
Climate Wins

Proposal strategy for predicting European weather variations using machine learning

Keanu Gomes

CareerFoundry Online Academy for Tech

May 1st, 2024



What is
Objectives
Summary

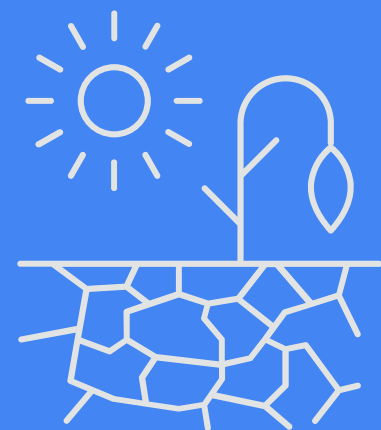
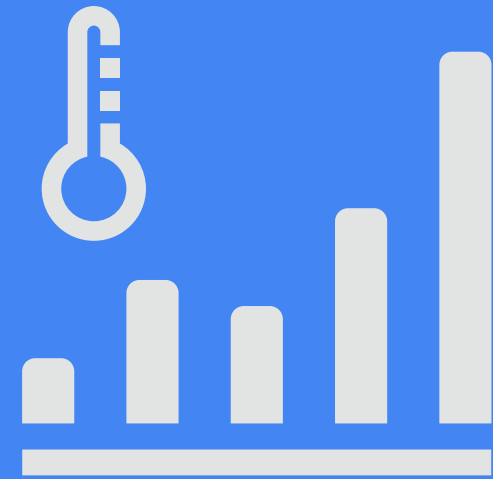
Machine Learning Options

Thought Experiments

Recommendations

Outro

The project objectives are to

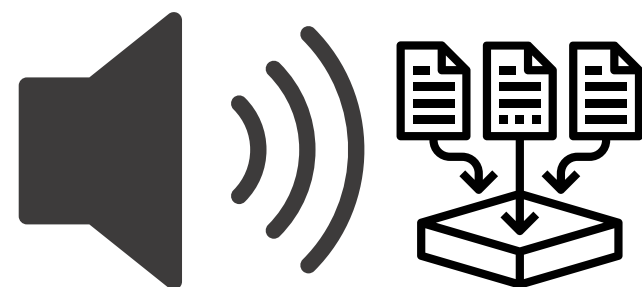


- Identify weather patterns outside the regional norm in Europe.
- Determine if unusual weather patterns are increasing.
- Generate possibilities for future weather conditions over the next 25 to 50 years based on current trends.
- Determine the safest places for people to live in Europe over the next 25 to 50 years.

Advanced Weather Detection and Location Optimization

One:

- Look into weather pattern detection using GANs with audio classification and satellite imagery.



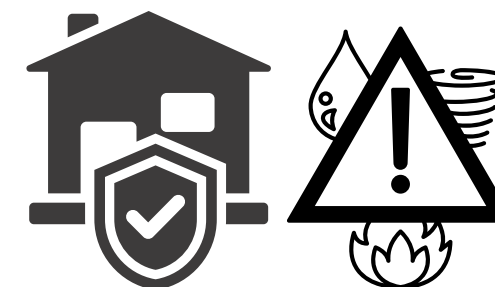
Two:

- Explore the concept of live weather vehicle alerts, data collection, and retrieval based on weather conditions for safer travel.



Three:

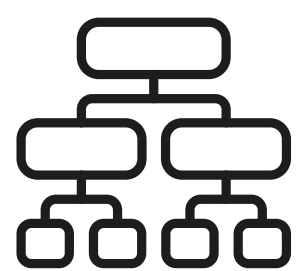
- Develop a model to determine optimal locations for new homes or vacation spots based on environmental factors.



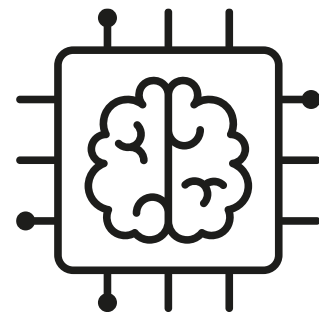
Random forest algorithm and GANs used with CNNs produced the highest accuracy and lowest loss predictions

Supervised learning

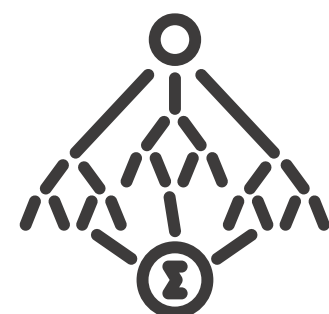
- Decision Tree
- Artificial Neural Networks (ANNs)
- Random forest



40%



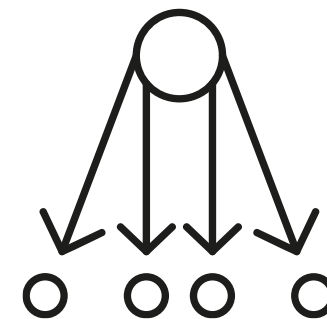
45%



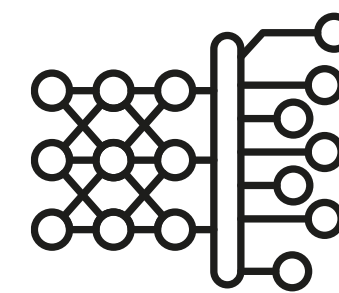
88%

Unsupervised learning

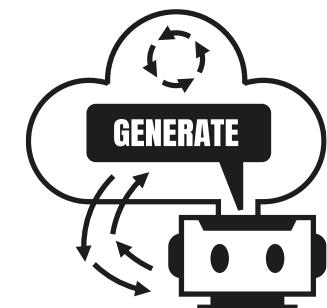
- K-Nearest Neighbors (KNNs)
- Convolutional Neural Networks (CNNs)
- Generative Adversarial Networks (GANs)



45%



64%



94%

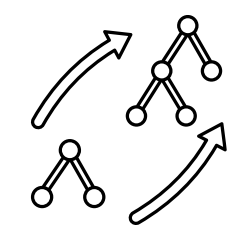
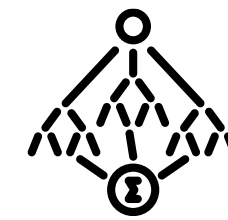
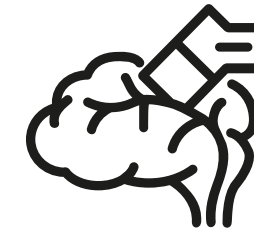
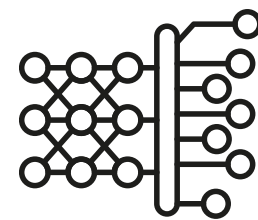
'The Climate Time Capsule'

What it is:

- Imagine creating a virtual time machine that shows us how climate change could alter our world over the next 25 to 50 years.
- It's like using a complex puzzle-solving app that can predict the picture on the puzzle based on pieces from the past and present.
- **Other use cases:** Future preparedness, disaster planning, safe living, real estate investment, agriculture, business development.

Machine learning role:

- Neural Networks, Random Forest, GBM.



Data beyond weather:

- Environmental policies, socioeconomic data, biodiversity records, open-source survey data on pleasant weather days.

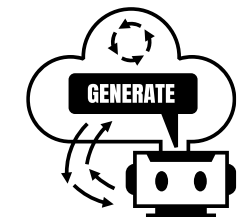
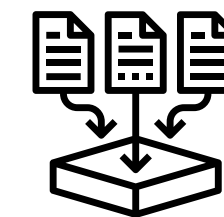
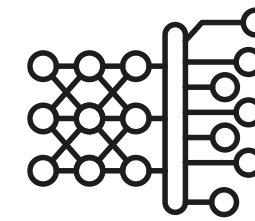
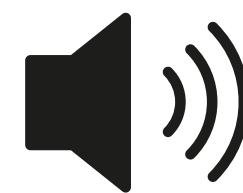
‘The Climate Symphony Orchestra’

What it is:

- This is about listening to the Earth’s ‘music’—the sounds of rain, wind, and wildlife—to understand weather events.
- In this experiment, we use audio classification to “listen” to the Earth. A network of sensors placed around Europe collects audio data, capturing the sounds of the environment.
- **Other use cases:** live vehicle weather alerts, data retrieval for weather-related accident reports, weather-related vehicle adjustments.

Machine learning role:

- Audio Classification Models (e.g., CNNs for sound).
- Image Classification Models (e.g., GANs for image).



Data beyond weather:

- Audio recordings, satellite imagery, correlation data between sounds, images, and weather events, anthropogenic noise data (removes human noise).

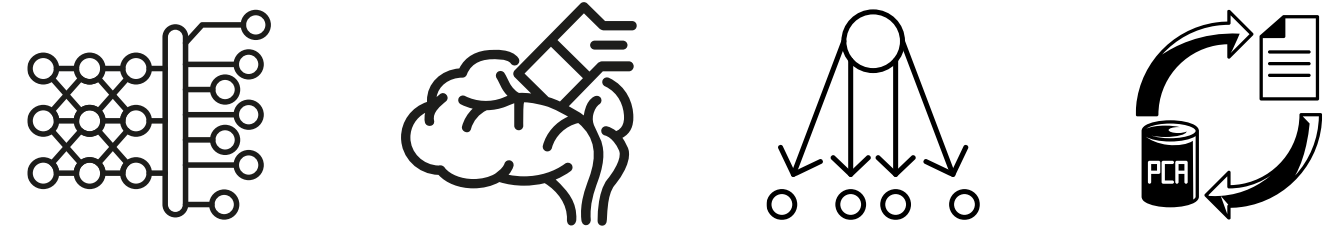
'The Safe Haven Map'

What it is:

- A map that helps us find the safest places to be during extreme weather events, which are becoming more common due to climate change.
- It's similar to a navigation app that doesn't just give you the fastest route but also the safest one based on current and predicted conditions.
- **Other use cases:** safe living areas, vacationing, visiting, real estate investment, vehicle tech.

Machine learning role:

- Neural Networks, K-Means Clustering, PCA.



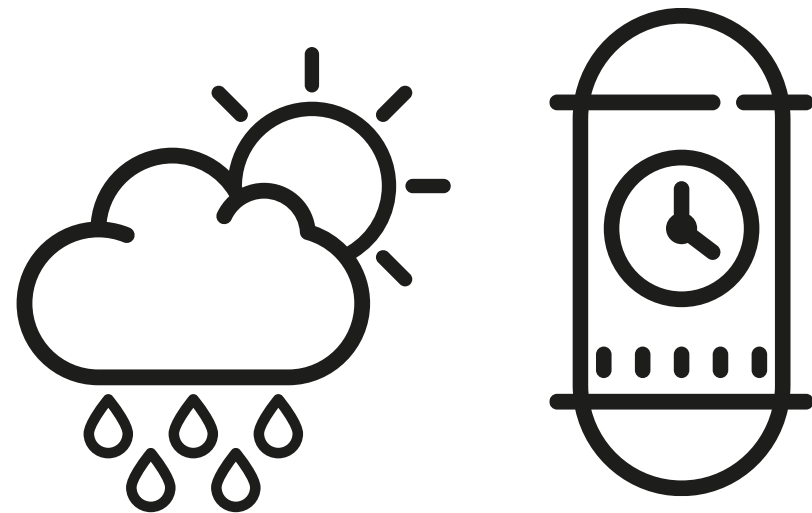
Data beyond weather:

- Infrastructure resilience data, population density and migration patterns, resource distribution data, such as water and food supply chains.

What thought experiment has the most potential for answering ClimateWins objectives?

Most potential:

- ‘The Climate Time Capsule’



Why:

- Offers comprehensive simulation of long-term climate impact while also considering affect, resources, and equipment maintenance.

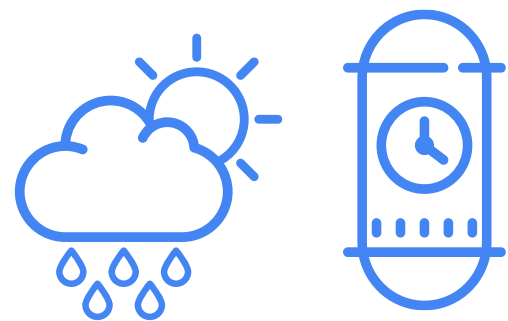
Next steps:

- Data collection, model refinement, stakeholder engagement, implementation planning.

How can 'The Climate Time Capsule' be accomplished?

How:

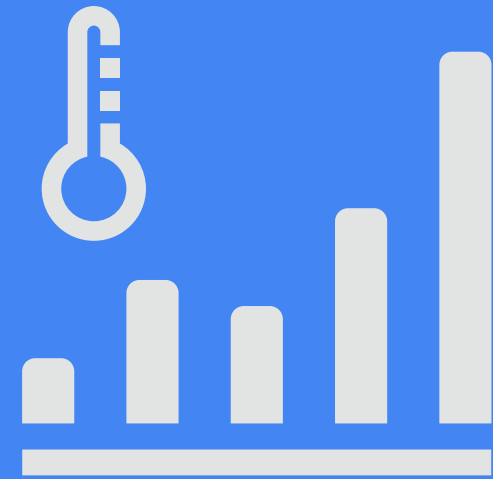
- Predictive analysis
- Pattern recognition
- Data clustering
- Time-series forecasting
- Data simulation (GANs)



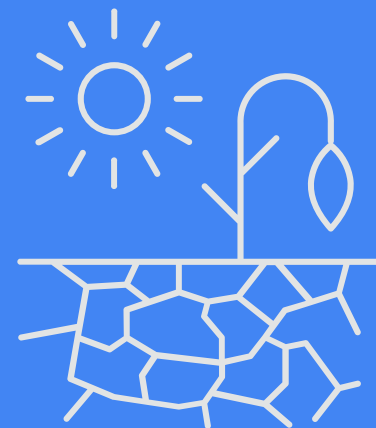
Additional models include:

- **Neural Prophet:** For forecasting time-series data.
- **LSTM:** Long-short-term-memory model, time-series data.
- **Support Vector Machines (SVM):** For classification and regression of climate variables.
- **Decision Trees:** For clear, interpretable decision-making.
- **Recurrent Neural Networks (RNN):** For analyzing time-series data, such as weather time series.

Thank you for your time!



This concludes my proposal strategy for ClimateWins.



Questions and comments?

Email: keanudatatech@gmail.com

