CLIMATEWINS

DATA-DRIVEN WEATHER TECHNOLOGY FOR A CHANGING FUTURE

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AGENDA

- OBJECTIVES
- MACHINE LEARNING METHODS OVERVIEW
- THOUGHT EXPERIMENTS
- SUMMARY & RECOMMENDATION

OBJECTIVES

Predict weather patterns and identify Europe’s safest regions from extreme weather

1. Detect significant deviations in Europe's weather from historical norms
2. Analyze if unusual weather patterns in Europe are increasing over time
3. Forecast future weather and identify the safest European regions to live.

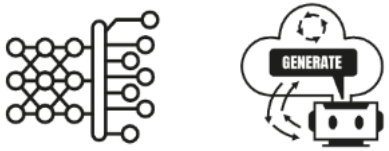
MACHINE LEARNING METHODS OVERVIEW

RANDOM FOREST

- Combines multiple decision trees to improve predictive accuracy.
- **Application:** Feature importance analysis and risk assessments for identifying safe regions

ANNs and RNNs

- ANNs detect spatial patterns; RNNs capture temporal dependencies in sequential data.
- **Application:** Identify deviations in weather patterns and forecast future conditions.



CNNs and GANs

- CNNs are primarily used for image classification. GANs are used for generating realistic data, such as images, videos, and audio
- **Application:** Simulate future weather scenarios to predict potential climate changes.

THOUGHT PROCESS 1

Artificial Neural Network (ANN). Accuracy Score: 55.6%

Objective:

- Identify weather patterns outside the regional norms in Europe
- Determine if unusual weather patterns are increasing

Data: Historical weather data sets

Possible Use Cases:

- Previous algorithm training to predict rudimentary weather labels
- Continuous variables to better identify patterns and anomalies

THOUGHT PROCESS 2

CONVOLUTION NEURAL NETWORKS (CNN) & GENERATIVE ADVERSARIAL NETWORKS (GAN)

Accuracy Score for CNN: 71.62%

Objective:

- Identify weather patterns outside the regional norms in Europe based on historical data and images
- Generate possibilities for future weather conditions over the next 25 – 50 years based on current trends

Data: Historical weather data sets & weather images

Possible Use Cases:

- Previous algorithm training to identify weather images
- Identify anomalies based on weather condition images from other sources
- Training a model on the distribution of weather data in a region.

THOUGHT PROCESS 3

CONVOLUTION NEURAL NETWORKS (CNN) & RANDOM FOREST

Accuracy Score: 71.62% for CNN and 54.2% for Random Forest

Objective:

- Conduct risk assessments, factor in predicted weather conditions, and assess regional safety
- Identify weather patterns outside the regional norms in Europe based on historical data

Data: History of weather data sets

Possible Use Cases:

- Identify anomalies and most dominant factors affecting climate change based on historical data
- Determine the safe living areas for the future.

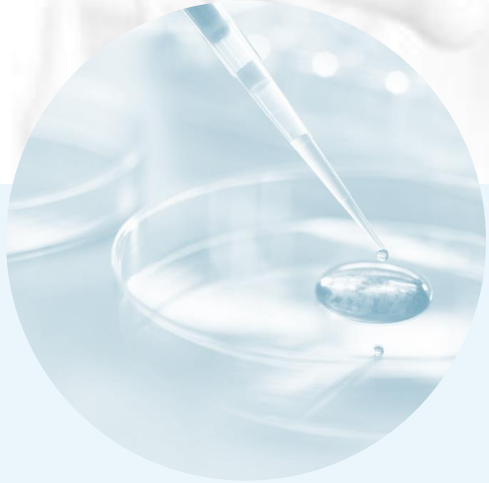
CONCLUSION & NEXT STEPS

CONCLUSION

- **Thought experiment 2**'s use of CNNs for spatial pattern recognition and high accuracy in detecting weather condition anomalies provides a robust foundation for predicting future climate impacts
- Combining with **Random Forests'** categorization power will provide ClimateWins with comprehensive insights to detect climate anomalies and predict future weather impacts effectively
- **GANs** may give various possibilities for the future for a better prediction.

NEXT STEPS

- Data collection, model refinement, and implementation planning.
- Applying more suitable models for time-series analysis such as RNN, Neural Prophet, or LSTM.



THANK YOU

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