

ClimateWins

Data-driven weather technology for a changing future.

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Overview

1. Project Objectives & Context
2. Machine Learning Options
3. Necessary Data
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Project Objectives & Context

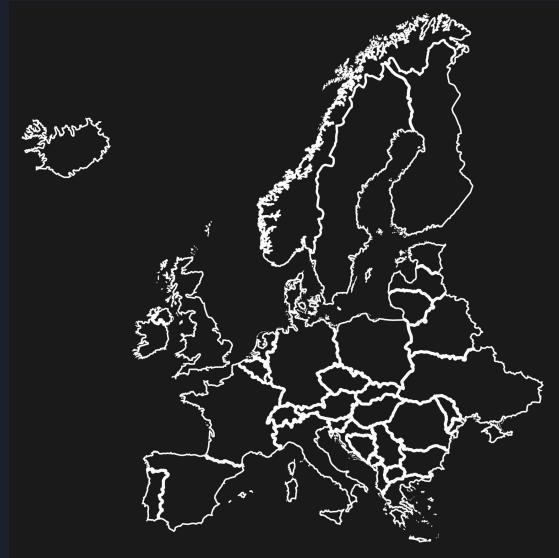
What problems are we trying to solve?

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.





Project Objectives & Context

What are some possible ways forward?

- 01 Identify weather patterns and anomalies for specific cities with Artificial Neural Networks (ANNs).
- 02 Generate possibilities for future weather conditions by using Generative Adversarial Networks (GANs).
- 03 Predict city safety with Random Forest and Convolution Neural Networks (CNNs).

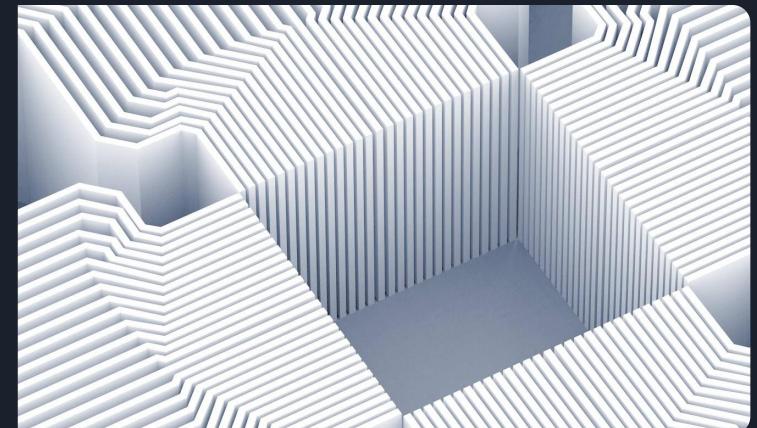
Machine Learning Options

Linear regression

Neural Networks (ANN, CNN)

Generative adversarial networks (GANs)

Random Forest





Necessary Data

European Climate Assessment & Data Set + Corresponding Pleasant Weather Data

- Fifteen weather stations ranging from the late 1800s to 2022.
- Temperature, wind speed, snow, global radiation, and more.

Other Directions

- Census data
- Economic growth

Thought Experiments





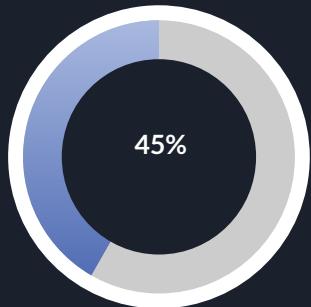
Thought Experiment 01

Artificial Neural Networks (ANNs)



Objectives

- Identify weather patterns outside the regional norm 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

ANN Success Rate
Predicting Rudimentary
Weather Labels



Generative Adversarial Networks (GANs)

Objectives

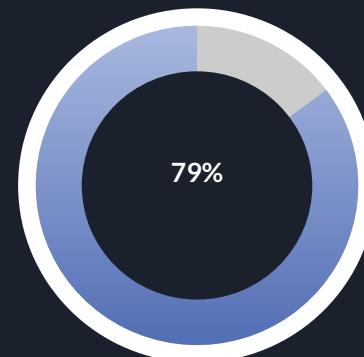
- Identify weather patterns outside the regional norm in Europe.
- Generate possibilities for future weather conditions over the next 25 to 50 years based on current trends.

Data

- Weather data sets + weather images

Possible Use Cases

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



CNN Success Rate on
Weather Images





Thought Experiment 03

Random Forest & Convolution Neural Networks (CNNs)

Objectives

- Determine the safest places for people to live in Europe over the next 25 to 50 years.

Data

- Weather data sets
- Census and economic growth data

Possible Use Cases

- Prior Random Forest algorithm importances: Maximum temperature + precipitation
- Infrastructure factors in extreme weather responses



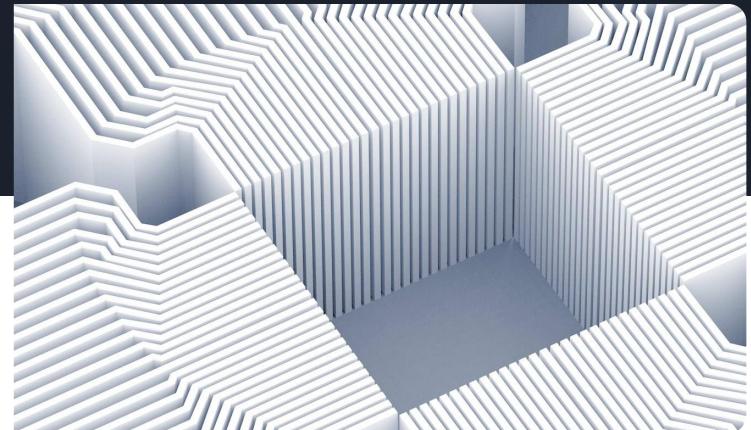
Summary & Recommendations

Multiple Possibilities:

- Weather patterns, image generation, and city safety assessment

Next Direction:

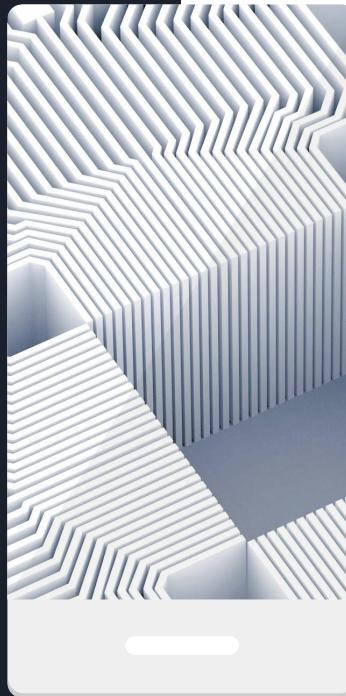
- Thought Experiment 03: Random Forest & Convolution Neural Networks (CNNs)



Summary & Recommendations

Algorithms & Data

- Random Forest
- Convolution Neural Networks (CNNs)
- Weather data sets
- Census and economic growth data



Next Steps

- Exploratory analyses of disaster relief, economic growth, and census data.
- Conduct regression analyses on above factors.
- Continue fine-tuning algorithms' hyperparameters to optimize results.

Thank you!

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GitHub Repository:

<https://github.com/jsreev/ClimateWins>

