

Results of GAN Optimization

{This report accompanies Script 06 GAN Visual Weather Systems.ipynb}

Attempt #1:

- 5 epochs
- 81.7% accuracy
- 6.7% loss

Attempt #2:

- 10 epochs
- 84.3% accuracy
- 5.1% loss

Attempt #3:

- 15 epochs
- 91.5% accuracy
- 3.2% loss

Attempt #4:

- 20 epochs
- 98.4% accuracy
- 1.5% loss

Attempt #5:

- 25 epochs
- 98.4% accuracy
- 1.1% loss

Given that the accuracy has plateaued and loss is decreasing less rapidly, I believe 25 epochs yield optimal convergence.

Proposals for GAN Use in Climate Analysis

Proposal #1: Predicting Extreme Weather Events

Climate change has increased the rate of extreme weather events worldwide. General adversarial networks (GANs) may be useful in predicting regions that are more susceptible to such events. Accurate predictions would help authorities and non-government organizations plan for recovery and relief efforts.

Weather station data, such as the one used for this analysis, would be valuable in powering the GAN, along with data indicating the number of extreme weather events per month or year in those regions.

Existing research:

[Environmental Modelling & Software](#): GAN technology improves the reliability of flood predictions by accurately representing rainfall

[American Meteorological Society](#): GANs assist convolutional neural networks (CNNs) to improve severe weather predictions by 10% to 20%

Proposal #2: Identifying the Most Impactful Mitigation Measures

The world is set to [surpass the 1.5 C climate threshold](#) this year, indicating a tipping point after which severe consequences are more likely. Mitigation is more important than ever, and GAN technology may help us get there faster. Using data from countries that have implemented climate control measures and the impacts of those measures, the GAN could learn to identify which measures are most likely to work.

Existing research:

Though I found no evidence of GANs researching mitigation, there has been some research using GANs to investigate [climate tipping points](#) and identify likely parameters.

Proposal #3: Forecasting Impacts on World Economies

Because some powerful world governments prioritize economic growth in crafting policy, measuring climate change's economic impact may be valuable in facilitating change. GANs might provide reasonably accurate models demonstrating the effect of climate change on world economies. Using data on temperature fluctuations, extreme weather patterns, and gross domestic product (GDP), a GAN may be able to measure how countries' economic health would respond to the load of climate events.

Existing research:

Applied Energy: Scientists have used GAN to evaluate increased energy demand due to climate change. Such models could build on existing research into the economic impact of climate change.