CareerFoundry ML with Python
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Achievement 1.2 (Part 1): Ethics and Direction of Machine Learning Programs

Ethical and Bias Risks in ClimateWins' Machine Learning

ClimateWins must carefully address ethical challenges when applying machine learning to its data of weather observations from 18 European stations (late 1800s to 2022). Over this long span of time, there might be data collection biases, human errors or any inconsistencies. It is also possible to have data discrepancies through time.

With initial Python data check, it is clear that this data does not include personal identifiers. However, the combination of detailed geolocation and temporal records could indirectly reveal sensitive information about specific communities, particularly if they are linked with socioeconomic data. This kind of data may be useful if the end purpose is to address environmental justice, for example, but disclosure of any sensitive data should still be considered.

In relation to environmental justice is regional bias. Historical weather data heavily favors wealthier and urbanized regions with longer observation histories, while rural or coastal zones may be underrepresented. This kind of bias may have been addressed as technology like satellites improve over the years. Still, any imbalance could lead models to mischaracterize where climate risks are most severe, thereby unintentionally reinforcing inequality in adaptation planning.

Human bias may also emerge through subjective labeling or algorithm design choices, especially when deciding what constitutes a "favorable" or "hazardous" weather condition.

Furthermore, models trained on incomplete or biased data risk generating misleading forecasts. This reflects the "garbage in, garbage out" philosophy in AI and ML. These inaccuracies could influence funding, preparedness, or insurance decisions, with real human consequences. To prevent harm, **ClimateWins should employ data-weighting, transparency about uncertainty, ethical oversight, and regular auditing of model outputs.** Machine learning is important in decision support, but should serve as a highly monitored and supervised tool in climate action.