

## 1.2: Ethics and Direction of Machine Learning Programs

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**Read or watch at least one of the examples of machine learning. List article:**

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The video watched for this exercise was [Machine Learning and Human Bias](#).

([Google](#), 2018)

**What potential is there for bias or ethical issues when dealing with climate change data? Where would ClimateWins need to be cautious about using machine learning to develop answers? Consider the following questions and write an answer of around 200 words showing what pitfalls ClimateWins should avoid:**

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Machine learning (ML) is only as good as the data it is trained on (“garbage in, garbage out”), and if not carefully managed, it could lead to misleading conclusions and real-world harm.

**Is there personal information that may be exposed?**

The [Project Brief \(PDF\)](#) states that *ClimateWins* is working with NOAA, JMA, and European Climate Assessment data, which includes climate records and sensor data. While this data may not always be directly personal, farm-level or regional climate reports could expose sensitive information about land use or energy consumption. ML models must apply strict anonymisation techniques to prevent privacy breaches and ensure compliance with data protection regulations.

**Are there regional or cultural biases in climate change that might be made worse by using machine learning?**

The *Google* video highlights [Interaction Bias](#), where ML models reinforce common patterns—such as assuming a shoe is always a sneaker, neglecting ladies' high heels. Similarly, climate datasets are often biased toward developed countries with stronger monitoring systems, while underrepresented regions may have gaps in historical data. If *ClimateWins* does not address this, ML predictions may favour Western climate trends, reducing accuracy in the most vulnerable areas.

**Is there human bias in climate change that might be propagated while training machine learning?**

Historical underreporting of extreme weather events and industrialised-region-focused models can lead to biased predictions. *ClimateWins* must apply bias detection and correction techniques to ensure fair, accurate modelling.

**Could machine learning potentially make incorrect decisions about where weather conditions might worsen and cause harm?**

ML models excel at pattern recognition but cannot perfectly predict chaotic climate systems. Flawed models could misallocate resources, such as failing to warn of a heatwave, leaving cities unprepared. *ClimateWins* must ensure continuous validation and human oversight (i.e. ethical safeguards).