

# Waste Classification with AI

## Introduction to Fairness in Machine Learning

Ensuring fairness in machine learning is essential to prevent AI systems from reinforcing or exacerbating existing societal biases, particularly those related to various ethnic groups



## Definitions of Group Fairness

- **Demographic Parity:** Equal positive outcome rates for all groups.
- **Example:** If 60% of Group A is approved for loans, then 60% of Group B should also be approved, regardless of qualifications.
- **Equal Opportunity:** Equal chances of a positive outcome for qualified individuals across groups.
- **Example:** Among those who should receive a job offer, the offer rate is equal across all gender groups.
- **Equalized Odds:** Equal accuracy (and errors) for decisions across groups.
- **Example:** A diagnostic test misidentifies diseases at the same rate for both younger and older patients.
- **Predictive Parity:** Equal truthfulness of positive outcomes across groups.
- **Example:** Predicted successful loan repayments are equally accurate for all ethnic groups.

## Real-World Impacts



### Hiring Tools:

- Without fairness, a tool might favor applicants from a specific demographic, missing out on diverse talents.

### Loan Approvals:

- Biased algorithms could deny loans to qualified individuals based on their background, affecting their financial stability.

### Healthcare:

- If a diagnostic tool is biased, it could lead to unequal healthcare access or treatment quality.

## Best Practices for Achieving Group Fairness

- Gathering comprehensive and inclusive data
- Conducting consistent evaluations of algorithms to identify and mitigate biases
- Applying techniques in machine learning that prioritize fairness
- Ensuring the development team is diverse

