

## # Replication Instructions

To replicate the experiments in the project:

1. Clone or download the repository from: <https://github.com/meghanaS05/ISE-Fairness-Testing-Tool>
2. Open the notebook file: `ISE\_final tool.ipynb`
3. Run in Google Colab (recommended) or Jupyter Notebook
4. Follow the notebook structure:
  - Data loading and preprocessing
  - Model training (baseline, Random Forest, fairness-aware)
  - Metric computation: Accuracy, DPD, IDI, Intersectional fairness, Chi-Square
  - Graphs for visual comparison
5. Ensure outputs match the reported metrics:
  - Accuracy: ~0.83–0.85
  - DPD reduction in fairness-aware model
  - Chi-Square p-value > 0.05 for fair model

## ## Notes:

- Results may slightly vary due to stochastic elements in RandomizedSearchCV or random search IDI.
- Random seed (`random\_state=42`) is used for consistency.
- Train-test split: 80-20 stratified, preserving class and gender balance.
- All metrics (Accuracy, DPD, IDI) and visualizations are reproducible by running the notebook end-to-end.

## Expected output:

- Fairness-aware model should show significantly lower DPD and a statistically non-significant Chi-square result compared to baselines.
- Accuracy: ~0.83–0.85
- IDI slightly higher in fairness-aware model (expected trade-off)