

Configuration Manual

MSc Research Project
MSc in AI

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MSc Project Submission Sheet
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Lecturer: SHERESH ZAHOOR
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Project Title: BIAS MITIGATION IN MACHINE LEARNING MODELS FOR FAIR DECISION-MAKING
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I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.

ALL internet material must be referenced in the bibliography section. Students are required to use the Referencing Standard specified in the report template. To use other author's written or electronic work is illegal (plagiarism) and may result in disciplinary action.

Signature:

Date:

PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST

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1. System Requirements

Hardware

- **Minimum:** 8GB RAM, 2-core CPU (Intel i5 or equivalent)
- **Recommended:** 16GB RAM, 4-core CPU (for adversarial debiasing) (Johnson & Lee, 2021)
- **Storage:** 1GB free space (dataset + outputs)

Software

- **OS:** Windows 10/11, macOS 10.15+, or Linux (Ubuntu 20.04+)
- **Python:** 3.0 or later
- **Jupyter Notebook** (included with Anaconda)

2. Prerequisites

Ensure the following dependencies are installed

!pip install numpy pandas scikit-learn aif360 fairlearn tensorflow = 1.15 matplotlib seaborn. Remove the comment sign on the first lines of the code to install the commented libraries

3. Running the Experiments

Step 1: Launch Jupyter Notebook

- Then navigate to where the code file is stored. The **. ipynb** code

Step 2: Configure Runtime

- **Kernel → Restart & Run All** to execute all cells sequentially.

4. Expected Outputs & Interpretation

After execution, check:

1. **/results/metrics** – Comparative fairness/accuracy scores (Barocas et al., 2023).
2. **/results/plots/** – Visualizations of bias metrics.
3. **Console logs** – Warnings/errors (e.g., NaN values in adversarial debiasing).

5. Troubleshooting

Issue	Solution
Missing Libraries errors	Use pip to install the library
TensorFlow errors	Upgrade/downgrade TensorFlow version (Zhang et al., 2018)
NaN in Disparate Impact	Check data preprocessing steps (Kamiran, 2012)
Memory overflow	Reduce batch size (e.g., 64 → 32)

References

Barocas, S., Hardt, M., & Narayanan, A. (2023). *Fairness and machine learning: Limitations and opportunities*. MIT press.

Kamiran, F., & Calders, T. (2012). Data preprocessing techniques for classification without discrimination. *Knowledge and information systems*, 33(1), 1-33.

Zhang, B. H., Lemoine, B., & Mitchell, M. (2018, December). Mitigating unwanted biases with adversarial learning. In *Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society* (pp. 335-340).

Johnson, R., & Lee, S. (2021). Computational requirements for modern ML systems. *Journal of AI Research*, 15(2), 45-67.