Coursework 2 (50%)

You are required to select one of the 5 AI for sustainable development research projects provided in the course materials. You may also some other paper of your choice, but please ensure that the chosen paper has a reproducible model, documentation, dataset and other requirements:

1. Satellite Imagery to Predict Poverty - https://www.science.org/doi/abs/10.1126/science.aaf7894
2. HEARTS: A Holistic Framework for Explainable, Sustainable and Robust Text Stereotype Detection - https://arxiv.org/abs/2409.11579
3. Deforestation Detection - https://www.sciencedirect.com/science/article/pii/S0303243422000113
4. Environmental Monitoring - https://arxiv.org/abs/2502.00049
5. Drug Discovery - https://pubs.acs.org/doi/10.1021/acsmedchemlett.4c00131

Your task is to replicate and contextualise the selected project's AI methodology to address a sustainable development challenge relevant to your own country or a context of your choice. This assignment focuses on the transferability of AI methods across geographical and sectoral boundaries while maintaining methodological rigor.

Assignment Requirements

Part A: Technical Implementation (70%)

1. Replicate the baseline AI methodology using the open dataset
    a. Clone original repository successfully
    b. Document all dependencies and environment setup
    c. Reproduce baseline results within ±5% of original paper metrics
    d. Provide reproducible notebook or Python scripts
2. Identify a contextually relevant challenge in your country or region of your choice that can be addressed using the same AI approach
    a. Problem and SDG alignment
    b. Limitations and ethical considerations
    c. Scalability and sustainability analysis
3. Curate or identify an alternative dataset appropriate for your context
    a. Identify contextually appropriate dataset
    b. Document data collection/access process and ethical considerations
    c. Provide data preprocessing pipeline
4. Adapt the model architecture and training pipeline to your local context
    a. Justify architectural modifications for new context
    b. Document hyperparameter tuning process
5. Evaluate the adapted model, comparing performance metrics with the original study
    a. Compare original vs. adapted model performance
    b. Use appropriate metrics for problem type
    c. Conduct statistical significance testing
    d. Analyze failure cases

Part B: Poster Design and Presentation (30%)

Design an academic digital poster based on the provided template that communicates your adaptation process, results, and implications and limitations.

Assessment

You will need to submit the poster before the final presentation on Moodle. Please ensure that you have included a link to your github repository on the poster. Please stick to the template. In addition to your implementation, you will be assessed on a 2 minute presentation followed by 1 minute of questions / discussion / clarification.

1. The original paper and context (30s)
2. New context, data and justification (30s)
3. Describing the results and interpretation of the results (1min)

Marking Criteria

Technical Implementation	Outstanding (9 - 10)	Excellent (7 - 8)	Very Good (5 - 6)	Good (3 - 4)	Fail (1 - 2)
Methodology Replication	Flawless implementation of the original AI architecture resulting in a fully reproducible code.	Strong replication demonstrating solid understanding but with minor documentation gaps, but a functional outcome.	Adequate replication with logical context adaptation. Some details are unclear or simplified, and modifications could be stronger.	Basic replication with limited context adaptation which is simplistic with significant methodological gaps.	Incorrect or severely incomplete methodology replication.
Dataset Quality	The contextual dataset is highly appropriate and ethically sourced.	The contextual dataset is appropriate with good ethical consideration but with minor gaps.	The dataset is suitable for the task but dataset size or quality is limited.	The dataset is marginally appropriate and it may have obvious quality issues.	Dataset is inappropriate for the task, missing entirely, or impossible to verify.
Model Performance and Evaluation	Comprehensive evaluation with baseline comparison, ablation studies, statistical significance tests, error analysis, and fairness metrics - as much as possible.	Strong evaluation with multiple metrics, baseline comparison, and error analysis.	Adequate metrics (accuracy etc.) with baseline comparison but limited depth	Basic metrics reported but lacks comparison or interpretation	No evaluation or incorrect metric usage

Critical Analysis and Contextual Relevance	Deep analysis of SDG alignment, local challenges, ethical implications, limitations, and actionable policy recommendations.	Strong contextualization with clear SDG linkage and ethical considerations	Adequate context adaptation but superficial analysis of implications	Minimal contextualization; SDG connection unclear	No meaningful contextualization or completely inappropriate application
Poster Design and Presentation	Visually compelling, clear narrative flow, excellent time management, confident responses, accessible language	Professional design, logical structure, good presentation skills, competent answers.	Clear poster with minor design issues, adequate presentation	Basic poster with readability issues, rushed or unclear presentation	Illegible poster, incomprehensible presentation, or missing components

Poster Design Template

This will be provided in a .ppt format.