Group Project V:
The Unequal Machines Grand Challenge
A Critical Perspective on Algorithmically Assisted Decision-Making

The Unequal Machines Grand Challenge project is designed for you to engage simultaneously with computational social science and inequality research. You are encouraged to study the complex dynamics of inequality through the lens of rich datasets and computational methodologies. This description aims to provide an understanding of the structure and requirements of this project.

The final project deliverable will consist of:
- Demonstration of a socially responsible predictive algorithm.
- Written audit report demonstrating potential biases in the analysis and the measures that were taken to address those biases.
- Code and data submission.

Contents

How to work on the project...

...as a group:

- Maintain professional interactions with the core lecturer, project partner, and relevant stakeholders, including potential study participants.
- Establish a focused research agenda that aligns with the project's scope and objectives.
- Develop a comprehensive timeline with key milestones and regularly evaluate progress to ensure adherence to the schedule.
- Be mindful of implicit assumptions and biases concerning the challenges associated with youth digital exclusion, mental health, and other sensitive themes.
- Actively seek and incorporate feedback throughout the project, particularly during the weekly goals.
- Engage in critical reflection to identify weaknesses in the approach and make necessary adjustments.

...individually within your group:

- Demonstrate professionalism when collaborating with group colleagues, respecting diverse perspectives and maintaining effective communication.
- Fulfill the group expectations outlined in the Team Charter, contributing actively and responsibly to the project's success.

By working collaboratively and professionally, both as a group and as individuals, students will maximize their potential for success in developing a compelling digital intervention that drives system-level change in relation to health and mobility themes.

Deadlines

Day	Date (5 p.m.)	Which?	What?
Friday	07 February, 15:00 – 17:00	**Opening Event**	**Participation** Attendance Required
Monday	17 February, 17:00	**Week Goal 1: Project Setup** Project Outline Document *and* Stand-Up Report notes	Submission via Canvas
Monday	24 February, 17:00	**Week Goal 2: Regression** Stand-Up Report notes	Submission via Canvas
Monday	03 March, 17:00	**Week Goal 3: Count and Time Series** Stand-Up Report notes	Submission via Canvas
Monday	10 March, 17:00	**Week Goal 4: Time Series and Trees** Stand-Up Report notes	Submission via Canvas
Monday	17 March, 17:00	**Week Goal 5: Trees and Classification** Stand-Up Report notes	Submission via Canvas
Monday	24 March, 17:00	**Week Goal 6: Clustering and Qual** Project Outline Document *and* Project Outline Document	Submission via Canvas
Monday	31 March, 17:00	**Week Goal 7: Method Selection** Project Outline Document *and* Stand-Up Report notes	Submission via Canvas
Monday	14 April, 17:00	**Week Goal 8: Critical RQ** Project Outline Document *and* Stand-Up Report notes	Submission via Canvas
Monday	12 May, 17:00	**Week Goal 9: Critical Theory** Stand-Up Report notes	Submission via Canvas
Monday	19 May, 17:00	**Week Goal 10: Initial Bias Search** Stand-Up Report notes	Submission via Canvas
Tuesday	3 June, 10:00 – 14:00	**Closing Event: Algorithm Demonstration**	Group Presentation Attendance Required
Thursday	5 June, 17:00	**Code and Data Submission**	Final submission via Canvas
Thursday	5 June, 17:00	**Algorithm Audit Report**	Final submission via Canvas

Week Goals

Stand-Up Report

Most weeks during Check-In your group will be expected to give a short "stand-up" report on your group project progress and/or pain points. These are very brief – 5 to 10 minutes – presentations that you can give either with or without visual aids (ex. PowerPoint slides, handouts). The idea is to get ideas and feedback (verbal, not written) from your peers and CL. As such, most weeks your Week Goal is simply the notes that your group will use during the stand-up. Assessment will be on the basis of your ability to critically reflect on the needs of your project and your having made a sincere effort to elicit relevant feedback.

Project Outline Document

This semester you will also be expected to maintain a Project Outline Document. This will be a living document where you track the essential aspects of your project. You will need to update this document as you progress to reflect your project's current status. The document will be shared with your CL, but will also be referenced in workshops and practicals. An updated version of this document will occasionally be required as part of a Week Goal.

Recommended Outline:
- Problem statement, including relevance to social inequality and/or bias
- Research questions, qualitative and quantitative
- IV and DVs
    - Variable names and brief description
    - Response scale
- Project structure diagram/s
    - Qualitative and quantitative analyses
    - Database management structure
    - Data pipeline flowchart
- Method Analysis: (ex. Regression, Count Data, etc.)
    - Model selection
    - Basic assumptions of the model
    - Evaluation metric/s
    - Assessment of utility for Group Project

Progress Checks and Deadlines

Please note that there are no "Progress Checks" for Week Goals this semester. Every Week Goal has a single, final deadline. You will still receive feedback on your submissions, but it is assumed that you will incorporate that feedback directly into your final project.

Mindless Machine Phase

Get the best evaluation metric possible, by any means possible.

Week Goal 1: Project Setup

Deadlines

- 17:00, Monday, Feb. 17

Deliverable

- Create a Project Outline Document to be shared with your Core Lecturer (see the recommended outline above).
    - This week you should create the document and agree on how it will be maintained and shared, create the major headers, and create the first draft of your problem statement.
- Stand-Up Report notes:
    - Your problem statement.
    - Initial data cleaning and exploration.
    - Ideas for additional data.

Feedback

- Feedback will be via student presentations during Check-In on February 18.

Assessment Criteria: Stand-Up Report notes

- Appropriately scoped problem statement.
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

Week Goal 2: Regression

Deadlines

- 17:00, Monday, Feb. 24

Deliverable

- Stand-Up Report notes
    - Method analysis: regression with group project data
      The answer may be that the method is inappropriate, but that must be supported with adequate rationale.
    - Code Update: Results OR pain points

Feedback

Feedback will be via student presentations during Check-In on February 25.

Assessment Criteria: Stand-Up Report notes

- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

Week Goal 3: Count and Time Series

Deadlines
- 17:00, Monday, March 3

Deliverable
- Stand-Up Report notes:
    - Method Analysis: Count and/or Time Series
    - Code Update:
        - Improved version of last week's model (results OR pain points)
        - Attempt at new model (results OR pain points)

Feedback
Feedback will be via student presentations during Check-In on March 4.

Assessment Criteria: Stand-Up Report notes
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

Week Goal 4: Time Series and Trees

Deadlines
- 17:00, Monday, March 10

Deliverable
- Stand-Up Report notes:
    - Method Analysis: Time Series and/or Trees
      If you reported on time series in WG3, you must report on trees this week.
    - Code Update:
        - Improved version of an earlier model (results OR pain points)
        - Attempt at new model (results OR pain points)

Feedback
Feedback via student presentations during Check-In on March 11.

Assessment Criteria: Stand-Up Report notes
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

Week Goal 5: Trees and Classification

Deadlines
- 17:00, Monday, March 17

Deliverable
- Stand-Up Report notes:
  - Method Analysis: Trees and/or Classification
    If you reported on trees in WG4, you must report on classification this week.
  - Code Update:
    - Improved version of an earlier model (results OR pain points)
    - Attempt at new model (results OR pain points)

Feedback

Feedback via student presentations during Check-In on March 18.

Assessment Criteria: Stand-Up Report notes
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

Week Goal 6: Clustering and Qualitative Research

Deadlines
- 17:00, Monday, March 24

Deliverable
- Updated Project Outline Document:
  - Draft qualitative research question
  - Outline of qualitative research method
- Stand-Up Report notes:
  - Method Analysis: Classification and/or Clustering
    If you reported on classification in WG5, report on clustering this week.
  - Code Update:
    - Improved version of an earlier model (results OR pain points)
    - Attempt at new model (results OR pain points)

Feedback

Feedback via student presentations during Check-In on March 25.

Assessment: Qualitative Research Question and Outline of Method
- Appropriately scoped research question
- Relevance and alignment with project goals.

Assessment Criteria: Stand-Up Report notes
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

Week Goal 7: Method Selection for Mindless Machine

Deadlines
- 17:00, Monday, March 31

Deliverable
- Updated Project Outline Document
  - Must include IV and DV information for selected method.
  - Must include evaluation metric for selected method and rationale.
  - Must include data pipeline flowchart.
- Stand-Up Report notes:
  - Final Update on the "Mindless Machine"
    - If anything isn't working yet (and why)
    - Results so far
    - First interpretations of model results
  - What is your plan for moving forward and why
    - Final research question for standard data science prediction
    - Most likely method
  - Initial insight from applying a realist or liberal lens (chose one) to the project.
    - Any thoughts on how the theory and the data relate.

Feedback
Feedback will be via student presentations during Check-In on April 01.

Assessment Criteria: Project Outline Document
- Application of appropriate digital methods for prediction.

Assessment Criteria: Stand-Up Report notes
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

The Auditor Phase

Assess what you have done from a critical perspective, keeping social in/equality in mind. Come up with a strategy to find and address sources of bias in your analysis.

Week Goal 8: Critical Research Question

Deadlines
- 17:00, Monday April 14

Deliverables
- Updated Project Outline Document
    - Must include critical research question.
    - Must include project structure diagram, showing qual and quant research.
- Stand-Up Report notes:
    - Critical research question
    - Update on qualitative research
- Qualitative research method guide and results of the ethics self-assessment tool.

Feedback
Feedback will be via student presentations during Check-In on April 15.

Feedback on the qualitative methods guide and ethics self-assessment may be either verbal during Check-In on April 15 or written on April 16. As students received dedicated workshops developing and using these materials, CL feedback will be limited.

Assessment Criteria: Critical research question
- Appropriately scoped research question
- Relevance and alignment with project goals.

Assessment Criteria: Stand-Up Report notes
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.
- Evidence that qualitative research is proceeding at an adequate pace (results due April 16).

Assessment Criteria: Qualitative method guide and ethics self-assessment
- Sincere and truthful attempt at ethics self-assessment.
- Relevance and adequateness of the qualitative method guide for exploring the topic.
- Qualitative method guide takes stakeholder's framing of the topic into account.

Week Goal 9: Critical Theory

Deadlines
- 17:00, Monday, May 12

Deliverable
- Updated Project Outline Document
  - Must include project structure diagram
- Stand-Up Report notes: Insight from **one** critical theory
  - What does the theory say about this topic?
    - Note that you should choose only one critical theory to use in your final report. If you have not yet decided which theory is most appropriate, you may raise that question now for feedback.
  - How might that show up in data and your prediction/s?
  - Efforts to enrich the dataset.

Feedback
Feedback will be via student presentations during Check-In on May 13.

Assessment Criteria: Project structure diagram
- Convincingly relates qualitative and quantitative research results.

Assessment Criteria: Stand-Up Report notes
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

Week Goal 10: Initial Bias Search

Deadlines
- 17:00, Monday, May 19

Deliverable
- Stand-Up Report Notes: The Hunt for Biases
  - Systematic account of your search for bias
    - Evidence that you planned a systematic search.
    - How you tested.
  - Selected strategy/ies for fixing bias
  - Evaluation of privacy risk in training

Feedback
Feedback will be via student presentations during Check-In on May 20

Assessment Criteria: Stand-Up Report notes
- Critically reflects on the needs of the project.
- Sincere attempt at eliciting feedback from peers and CL.

Accommodations for All Week Goals

Specific elements, including word counts and deadlines, may vary based on project-specific needs, with previous agreement from your Core Lecturer.

It is important to note that these Week Goals may be adjusted based on the specific requirements and progress of the project. The timeline provided here allows for a structured approach to the project, ensuring that all objectives are met and contributing to the timely completion of the final project report. Should the sequence of Week Goals outlined here impede, rather than support, your approach, you may request an accommodation.

Accommodations will only be granted in exceptional circumstances and must be well-justified given the internal logic of the research plan. Accommodations will not be made for student-specific circumstances through this procedure. There is a separate procedure in place to request deadline extensions or other accommodations due to student circumstances; see the "Force Majeure" section of the Course Manual, your Core Lecturer, or the Study Advisor.

Final Deliverables

Algorithm Demonstration

Deadlines
Tuesday, June 03, 10:00 – 14:00, via oral presentation

Deliverable
The group will present their revised algorithm at the Closing Event for the semester. Create an effective presentation using appropriate language and visualizations. The focus of the presentation should be on the algorithm itself, rather than on the larger audit process – this is not a summary of your report!

Assessment Criteria
- Attendance and participation at closing event.
- Effective communication of results:
    - Explains the algorithm's purpose and what problem it solves, highlighting social responsibility.
    - Describes the high-level steps or components of the algorithm.
    - Discusses the algorithm's results and/or efficiency in comparison to the base "mindless machine" model.
    - Discusses challenges and/or limitations associated with the algorithm.
- Appropriate use of supporting elements, for example:
    - Diagrams, flowcharts, or pseudocode to illustrate how the algorithm functions.
    - Real-world use cases where the algorithm could be beneficially employed.
    - Scenarios where the algorithm may not be the best choice.
- Effective use of language and visualizations.

Code and Data Submission

Deadlines
Thursday, June 05, 17:00: Final submission of zip folder via Canvas

Deliverable
All code and data needed to reproduce your work.

Assessment Criteria
- Code runs and is sufficient to reproduce the analysis.
- Data is appropriate for a rigorous analysis of the research question and is sufficient to reproduce the analysis.
- Logical code structure with clear and professional commenting.
- Competent implementation of machine learning techniques for prediction.
- Soundness of data preparation, including any necessary data linkages.
- Competent implementation of a systematic bias audit as demonstrated through high-quality code and logical code structure.

Version	Date	Changes
1.0	20 Jan 2025	None
1.1	29 Jan. 2025	Updated deadlines

Algorithm Audit Report

Deadlines
Thursday, June 05, 17:00: Final submission of PDF file via Canvas

Deliverable
Written report of the results of your algorithm audit process and its relevance for social inequality. The report should integrate qualitative and quantitative methods to explore the potential impact of algorithmic decision-making on social in/equality in the assigned topic area. It identifies relevant threats and opportunities to social equality posed by algorithmic decision-making, and presents an analysis of how we might address potential biases in order to make long-term, pro-social outcomes more likely.

Recommended Structure of the Report
- Executive Summary
- Introduction and Problem Statement
- Background and Policy Relevance
- Data and Methods
    - Include appropriate data visualizations.
    - Include a visualization (flow chart) of your experimental setup, including your data-processing, algorithm tuning and use, audit methods, etc.
- Contextualization of results
    - Use qualitative research results to contextualize your digital analysis.
    - Use theory and desk research to identify sources biases and contextualize your digital analysis.
- Audit Results
    - Bias reduction techniques that you employed.
    - Impact of bias reduction on the performance of the algorithm.
- Discussion and Conclusion
    - Benefits and drawbacks of the audited algorithm.
    - Discuss the potential impact of the audited algorithm on social inequality, focusing on **ONE** of the major domains discussed this semester:
        - The impact of IT business models.
        - The law and governance.
        - Civil society and critical political movements.
    - Discuss opportunities for improvement.
- Appendices:
    - Project Outline Document
    - Annotated Data Source List
    - Stakeholder analysis, updated.
    - Ethics assessment results and any required ethics documentation. This may include, for example, informed consent forms.
    - Any relevant supporting materials for your qualitative research. This may include, for example: interview guides, focus group support materials, survey questionnaire, etc.
    - Annotated list of relevant laws and regulations for the jurisdiction.

Assessment Criteria

- Appropriately scoped project with relevant research questions and non-trivial hypotheses.
- Appropriate use of social science theories to support structural arguments:
  - Uses theory (traditional or critical) to explain the status quo.
  - Use of one critical theory: feminism, a critical economic approach, or post-colonialism.
  - Analysis is at the structural level.
- Application of appropriate qualitative methodology and quality of the interpretation of results.
- Application of appropriate digital methods for prediction and quality of the interpretation of results.
- Convincingly links insights from qualitative and quantitative methods to assess social inequality, taking stakeholders into account.
- Minimum academic requirements:
  - 5,500 word maximum (strict maximum), excluding references, figures and tables, and appendices. *Note that the scale and content of figures and tables should be appropriate to the format.*
  - On-time submission of a sincere attempt at every Weekly Goal.
  - Well-written and edited, with a logical structure.
  - Relevant academic sources are adequately utilised and correctly referenced.