AI-Driven Solution for Climate Change and Gender Inequality

1. Background

The United Nations Sustainable Development Goals (SDGs), highlight two critical global issues: the persistent gender inequalities and the increasing threats posed by climate change. While these issues are often examined independently, they intersect in many ways. Climate change exacerbates gender disparities, particularly in marginalized communities, where women, girls, and gender minorities face heightened vulnerability during environmental crises.

This project proposes a data-driven approach using a combination of Knowledge Graphs, Large Language Models (LLMs), RAG and Traditional Machine Learning techniques. This hybrid approach will allow us to model the relationship between climate change and gender inequality by leveraging **structured** and **unstructured** data sources, including reports, publications, and climate datasets.

2. Objectives

1. **Policy Effectiveness:** Evaluate the effectiveness of policies aimed at mitigating climate change and promoting gender equality.

2. **Climate-Resilient Infrastructure Development**: Based on the trends of the features, infrastructure improvements (e.g., flood-resistant housing, drought-resistant agriculture) could focus on reducing the disproportionate burden on women by improving access to critical resources.

3. **Resource Allocation and Disaster Relief:** Understanding the local climate dynamics (temperature, precipitation) helps allocate resources to vulnerable populations, with specific attention to the needs of women and marginalized communities (e.g., ensuring gender-sensitive distribution of aid post-disaster).

4. **Risk Assessment and Early Warning Systems:** These climate features can be used to develop predictive models that highlight areas at higher risk for disasters such as floods, droughts, and heatwaves. Policy measures can be directed to these regions to ensure gender-sensitive disaster preparedness plans.

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3. Methodology

3.1 Data Collection

- **Gender Inequality Data**:
    - Data on gender gaps in education, health, employment, and political participation etc will be collected from various sources.
- **Climate Change Data**:
    - Climate data from sources such as https://power.larc.nasa.gov
- **Policy Documents, Reports, Journals**:
    - Relevant reports, research papers and documents that highlight the **gendered impacts** of climate change.

3.3 AI

- Time-Series Forecasting
- RAG (Prompt at the end of document).
- Graph Database

3.4 Dashboard Development

- An interactive **AI-powered dashboard** will be created to visualize the data.

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4. Ethical Considerations

- **Bias and Fairness**: Ensure that machine learning models are not biased against marginalized gender groups.
- **Data Privacy**: Safeguard the privacy of individuals and communities when collecting and processing gender-disaggregated data.

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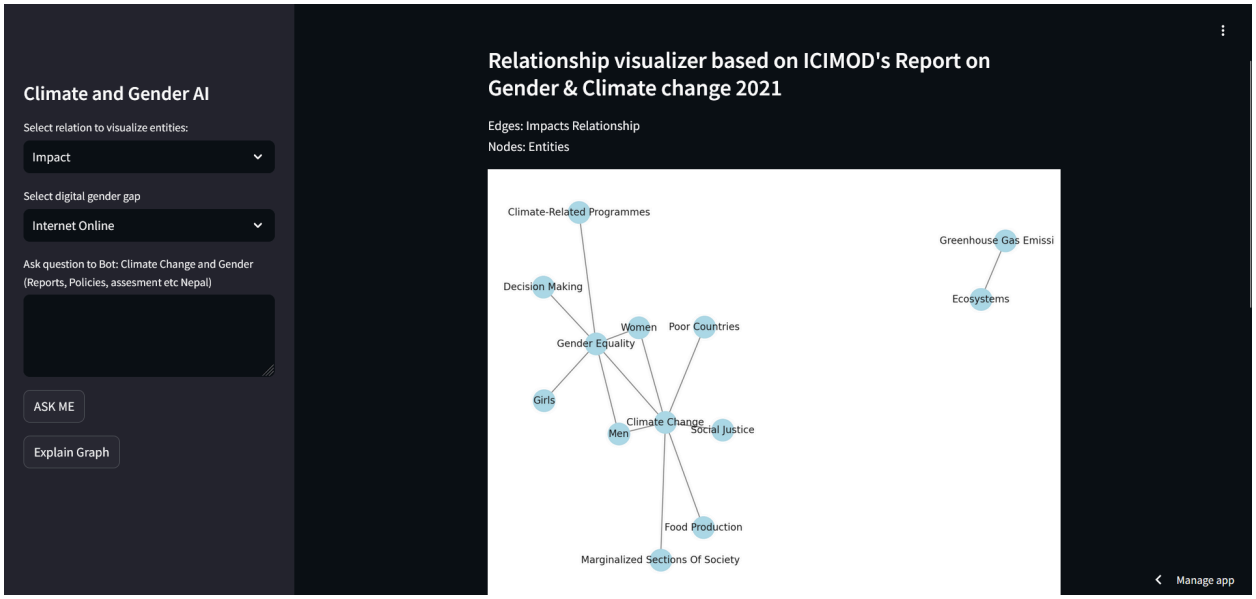
5. Application Demo and Link

- Application Link: https://climate-and-gender-ai.streamlit.app/

5.1 Screenshot



Ask question to Bot: Climate Change and Gender (Reports, Policies, assesment etc Nepal)

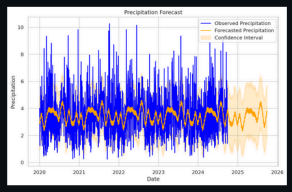
does climate change policy address gender?

ASK ME

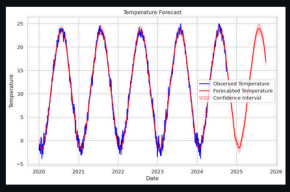
While there is a growing recognition of the need to include gender perspectives in climate change policy, significant gender-based barriers persist across international and national policy processes. [UNDP Linkages Gender and CC Policy Brief 1-WEB.pdf, page 5]

The lack of gender-disaggregated data hinders a thorough understanding of the gendered impacts of climate change, making it difficult to develop gender-specific policies and interventions. [s12889-024-18880-5.pdf, page 6] This lack of representation and evidence regarding the distinct ways climate change affects women contributes to the ongoing failure to meet the commitments outlined in the Gender Action Plan. [s12889-024-18880-5.pdf, page 6]

Precipitation Forecast

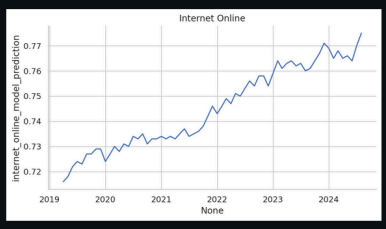


Temperature Forecast



Gender Inequality Index Time Series (Nepal)

Digital Gender Gap



Manage app

```
template = """
    Task: Answer the question using only the provided context: {context}.

    Context: The documents consist of reports, policies, and publications related to Climate Change and Gender Inequality.

    Instructions:

        Provide accurate, detailed answers strictly based on the given documents.
        Cite relevant references on the relationship between gender and climate change.
        Do not introduce information beyond the documents or make assumptions.
        If the query is unclear or lacks sufficient detail, ask for clarification before responding.
        Maintain a neutral tone in your answer.
        Avoid starting with phrases like "The provided text..."

    Question: {question}
"""
```