**Status Report: Role of AI in Combatting Climate Change**

**Introduction:**

One of the most important worldwide issues of our day is climate change, which has profound effects on the economy, society, and ecology. Because artificial intelligence (AI) provides a potent instrument to address several elements of this complicated issue, its role in addressing climate change has garnered substantial attention in recent years. The purpose of this study is to investigate how artificial intelligence (AI) may be used to improve adaptation and resilience tactics while also reducing the consequences of climate change.

This research aims to present a thorough knowledge of how artificial intelligence (AI) may be utilized to address the many issues that climate change presents. To lower greenhouse gas emissions, increase energy efficiency, and promote sustainable behaviours, it aims to pinpoint and examine the main areas in which artificial intelligence might be useful. The study will also look at how AI may be used to predict and manage climate change's effects, such as severe weather, rising sea levels, and a decline in biodiversity.

The potential for this study to educate communities, corporations, and governments about the advantages and best practices for using AI in efforts to mitigate and adapt to climate change makes it significant. This study can help address one of the most important global concerns of our day by demonstrating the useful uses of AI in this field and helping to establish strategies and solutions that work.

**Literature Review:**

Existing literature highlights the growing interest and potential of AI in combating climate change. Several studies have explored the use of AI for measuring and monitoring greenhouse gas emissions, optimizing energy systems, and supporting sustainable practices across various sectors (Rolnick et al., 2019; Kaack et al., 2021).

One of the key areas where AI has shown promising applications is in the measurement and monitoring of emissions. Researchers have developed AI-based models to estimate carbon dioxide emissions from satellite imagery and other data sources (Climate TRACE, 2021). AI has also been used to monitor deforestation and changes in natural carbon sinks, contributing to our understanding of the carbon cycle (Pachama, 2022).

In the realm of mitigation, AI has been utilized to improve energy efficiency in various industries, such as optimizing supply chains, predicting demand for renewable energy sources, and controlling intelligent irrigation systems (BCG, 2022). Additionally, AI has been employed in research and development efforts for sustainable technologies, such as carbon capture and storage (Gentine et al., 2022).

Regarding adaptation and resilience, AI has been applied in forecasting climate hazards, such as extreme weather events and sea-level rise (UNESCO, 2022). AI-based models have been developed to predict the impact of climate change on agricultural productivity, water resources, and biodiversity (IPCC, 2022).

While the existing literature highlights the potential of AI in addressing climate change, some gaps and areas need further exploration. Most of the current research has focused on developed countries, with limited attention given to the specific challenges and priorities of developing regions, which are often more vulnerable to the impacts of climate change (Radwan, 2023). Additionally, there is a need for more research on the ethical and responsible development and deployment of AI solutions in the context of climate change (Microsoft & BCG, 2022).

**Research Questions/Objectives:**

The following major issues and goals are the focus of this study, which is based on the gaps that have been discovered and the literature review:

1. In what ways may artificial intelligence be applied to successfully solve the unique climate change concerns that developing regions—especially those in the Global South—face?

* Objective: Determine and assess the particular vulnerabilities and needs associated with climate change that developing nations face, and investigate ways in which artificial intelligence may be customized to successfully tackle these issues.

1. In the context of mitigating and adapting to climate change, what are the ethical issues and best practices for the responsible development and application of AI solutions?

* Objective: This study aims to create a framework that addresses ethical and responsible AI activities related to climate change. The framework will consider several challenges, including data privacy, bias, transparency, and accountability.

1. 3. In the fight against climate change, how might artificial intelligence (AI) support cooperative efforts and knowledge-sharing across stakeholders (such as corporations, communities, academics, and policymakers)?

* Objective: To look at how AI may help different stakeholders work together, share data, and communicate, with an emphasis on encouraging group projects and knowledge sharing.

1. How can the obstacles and difficulties preventing the broad acceptance and application of AI solutions for climate change be overcome?

* Objective: To pinpoint the institutional, financial, and technological barriers preventing the uptake and scalability of AI solutions and to provide solutions.

**Proposed Methodology:**

To address the research questions and objectives outlined above, this study will primarily employ a desk research methodology, which involves reviewing and analyzing existing literature, reports, datasets, and online resources related to the applications of AI in combating climate change.

The methodology will involve the following steps:

* Literature Review:

Conducting a comprehensive review of academic literature, including peer-reviewed journal articles, conference proceedings, and book chapters, focusing on the use of AI for climate change mitigation, adaptation, and resilience.

Analyzing research reports and policy documents from reputable organizations, such as the Intergovernmental Panel on Climate Change (IPCC), United Nations agencies, and research institutes, to gain insights into the current state of AI applications in climate change efforts.

* Online Resource Analysis:

Exploring online databases, repositories, and platforms that provide access to relevant datasets, case studies, and real-world examples of AI applications in climate change mitigation and adaptation efforts.

Reviewing websites, blogs, and online forums dedicated to AI and climate change discussions to gather diverse perspectives and identify emerging trends and challenges.

* Data Analysis:

Identifying and collecting publicly available datasets related to greenhouse gas emissions, climate patterns, environmental indicators, and other relevant variables from reliable sources such as government agencies, research institutions, and non-governmental organizations.

Utilizing AI techniques, such as machine learning algorithms and data mining, to analyze the collected datasets and identify patterns, trends, and potential applications of AI in addressing climate change challenges.

**Potential Implications/Contributions**:

* Addressing the Climate Challenges in Developing Regions: This research might provide customized solutions for places that are frequently more exposed to the consequences of climate change by investigating how AI can successfully solve climate change challenges in developing regions. Global climate action may become more inclusive and egalitarian as a result of this.
* The creation of an ethical framework for AI activities in climate change adaptation and mitigation might guarantee that AI solutions give justice, accountability, and transparency priority. This might reduce any hazards related to the application of AI and promote confidence among stakeholders.
* Encouraging Cooperation and Knowledge Sharing: Researching AI's capacity to promote cooperation among interested parties may result in improved communication, data exchange, and group efforts to address climate change. This might enable more effective and coordinated efforts towards sustainability.

**Conclusion:**

To sum up, this status report offers a thorough summary of the research on artificial intelligence's potential to mitigate climate change. Important areas where AI may greatly support efforts in mitigation, adaptation, and resilience have been identified by a thorough examination of the literature. The indicated research topics and objectives seek to fill in the gaps in the body of literature, with a particular emphasis on the special difficulties that developing areas confront, ethical issues, stakeholder engagement, and adoption hurdles.

The suggested methodology, which uses desk research techniques to examine previously published books, papers, and databases, is in line with the study's goals. This project intends to find patterns and trends to guide successful climate change measures by utilizing AI tools for data analysis.