

The Social and Economic Impact of Artificial Intelligence on Global Income Inequality

A PROJECT REPORT (CAN704)
on
**The Social and Economic Impact of Artificial Intelligence on
Global Income Inequality**

A report submitted in partial fulfilment of the requirement for the award of

The degree of

Master of Computer Application

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CANDIDATES DECLARATION

I hereby certify that the work, which is being presented in the Report, entitled **The Social and Economic Impact of Artificial Intelligence on Global Income Inequality**, in partial fulfilment of the requirement for the award of the Degree of **Master of Computer Application** and submitted to the DIT University is an authentic record of my work carried out during the period *August 2024* to *November 2024* under the guidance of Dr. Rakesh Saini.

Date: 22 November 2024

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ABSTRACT

Thus, the purpose of this research paper is to compare the income inequality trends across the world from 2010 to 2021, paying attention to the AI technology influence on this issue. Employing the cross-sectional data from the number of countries belonging to various development groups, we investigate the relationship between the level of AI integration and changes in income inequality and discuss the potential impacts on social and economic policies.

Extensive adoption and incorporation of AI technologies that emerged within the last decade significantly impacted the general tendencies in global economics, industries, labour, and most importantly wealth distribution. This work intends to study the impact of AI on income disparity across countries, by analysing trends from the year 2010 to 2021, based on the level of country development. This work employs a cross-sectional data set across 195 countries and explores differences in income inequality levels with special attention to the relationship between AI adoption rate and changes in income distribution across various economic and regional settings.

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CHAPTER 1

INTRODUCTION

AI applications have advanced at a fast pace and have integrally impacted global economies; issues related to the effects of implementations of artificial intelligence on business revenues, income inequality, and social justice remain valid. To do this, this study intends to apply income inequality data to capture these dynamics across regions and development levels.

The fascinating progression and infusion of Artificial Intelligence across most disciplines have stirred various questions about the social-economic implications of the technology. Predominant among these threats is the perceived effect that AI has on income distribution since the problem is rife, and the gulf between the haves and have nots as well as within countries, is widening. AI means that the efficiency has increased, the automation is boosted, and new models of business are established which in fact change the economy and work environment drastically. But in fact, these transformations have deepened the existing differences in socio economic conditions. Therefore, the general objectives of this research paper include exploring and analysing these trends in income inequality globally and focusing particularly on the year 2010-2021 period, how the growth of AI technologies in our societies relates to the happening trends in inequality.

When AI is more deeply interwoven into the world economy, many skilled professionals as well as technology industries mainly and not all employees experience an ‘AI divide.’ This type of segmentation is like separating those who have an equal opportunity for the AI and those who have access to AI on the global level and their income/wealth difference. In developed economies AI has contributed to advances in innovation and productivity

with positive impacts on industries and workers in the leading edge of these. On the other hand, low-skilled employees are losing their jobs to automated technologies specially in the newly industrialized countries and there are very few prospects for these employees to move to the technology intensive jobs. As a result, in nations that have well-developed environments for the AI growth, there will be more significant improvements and in the nations that have not yet implemented the AI use into their economies vigorously, more potential threats of being left behind.

Moreover, as AI is unfolding in segments like finance, healthcare, education, or manufacturing, there is an even bigger demand for equal policies. The analysis of income inequality in this paper with incomes distribution data and AI development indicators is useful to comprehend the ways these differences must be regulated to achieve the increased beneficial impact of AI for communities with fewer profits. The evaluation of these trends is important since an increase in the inequality of the wealth distribution can lead to tensions in society, hinder people's promotion, and hinder the expansion of sustainable development around the world.

CHAPTER 2

Project Description

2.1. Purpose

To test this hypothesis, we decided to analyse how the AI impact was on income inequality during the period of 2010-2021. The effort here is to help policymakers to avoid such a negative impact.

2.2 Problem Statement

New problems such as the “AI divide” that contributed by a growing gap between billionaires and poor people. Such a situation puts at risk social justice, socio-economic stability and an equal distribution of technological gains.

2.3 Special Features

- Data analysis of income distribution by area with the help of more detail data.
- Polynomial trend analysis of income-performance variables on the AI uptake.
- List of policy recommendations to reduce inequality that could be brought by technology.

CHAPTER 3

Tools and Technologies

Hardware:

Standard computing hardware capable of running data analysis software, typically with the following specifications:

1. Processor: Multi core processor, such as Intel i5 or over
2. RAM: Minimum of 8GB (16GB for recommended when dealing with a large amount of data).
3. Storage: Accessible SSD or HDD space that would be at least 256 GB for data sets and outcomes.

Software:

1. Programming Language:
 - Python: The first and most common utilized programming language for data analysis and representation.
2. Libraries and Frameworks:
 - Pandas: Especially for data manipulation and analysis where the CSV files and DataFrames are the most commonly used.
3. NumPy: For performing arithmetic operations, mathematical operations and for array operations as well.
4. Seaborn: Fits in well with statistical computations to offer high level interface to draw nice looking graphics.
5. Matplotlib: A plotting library in Python allowing to build static, interactive, and animated visualizations.
6. Plotly: Which is used to generate real-time graphical interfaces for both applications and web resources to create sophisticated visualizations of data.

7. GeoPandas: An extension of Pandas for getting and handling geospatial data for plotting and analysis of geographical characteristics.
8. Scipy: It is also employed in scientific computation, technical computation problems as well as statistical calculations.
9. Missingno: A library for missing data visualization in datasets for understanding the missing value distribution.

Development Environment:

- Jupyter Notebook or any other IDE used in Pycharm or Visual studio for coding in Python by implementing it interactively.

CHAPTER 4

Implementation Modules and Screen Shots

This chapter outlines the implementation modules used in the project, including:

1. Data Loading: Loading the data set with the help of Pandas data frame.
2. Data Cleaning: Assigning missing values and other introductory measures to its analysis.
3. Exploratory Data Analysis (EDA): The first step in data preparation is used to gain first insights on the distribution of the data.
4. Visualization: Using different types of three-dimensional graphs such as histogram graphs, box graphs, scatter graphs to depict conclusions made.
5. Geospatial Mapping: Map creation to describe HDI ranks (Human Development Index) and income distribution using GeoPandas.

Screen Shots

1. Graphs Showing Regional Inequality Trends

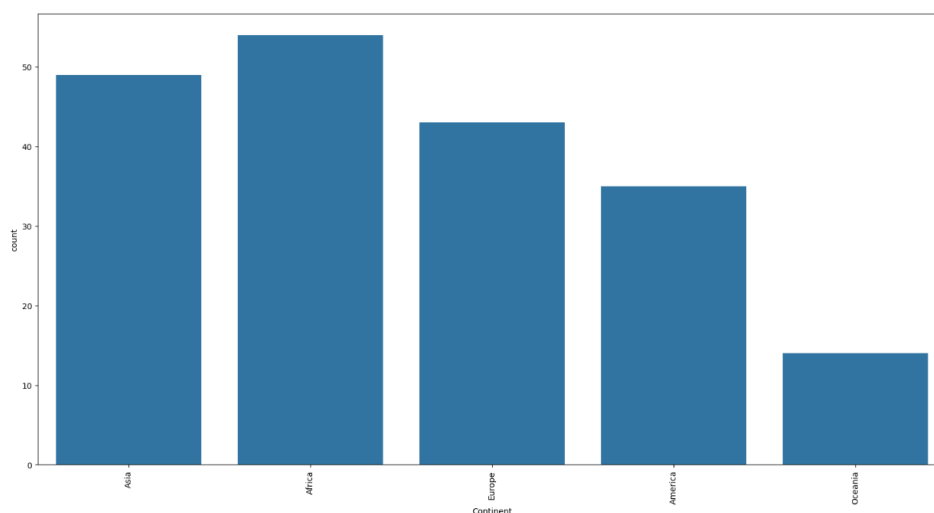


Figure 1: Bar Chart of Countries by Continent

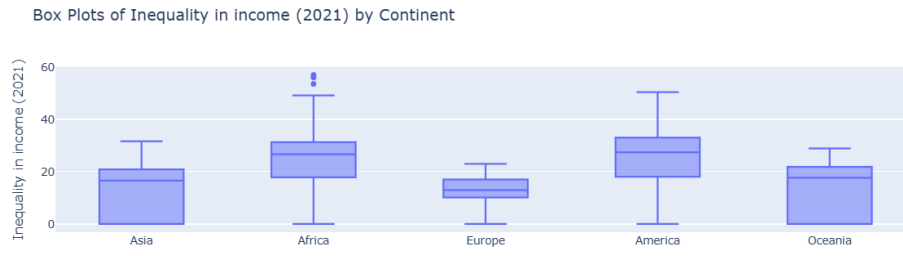


Figure 2: Box Plot of Inequality by Continent



Figure 3: Line Plot for Trends in Mean Inequality Over Years (2010 – 2021)

2. Correlation Maps of HDI and Income Inequality

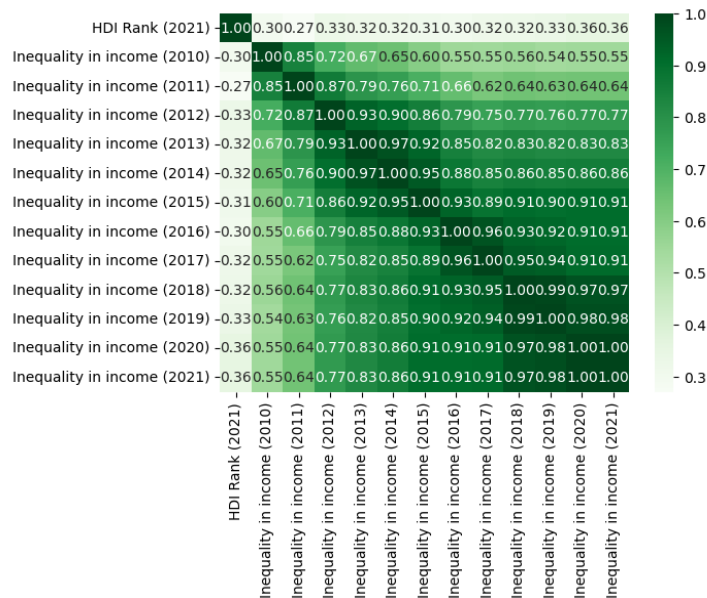


Figure 4: Correlation Heatmap

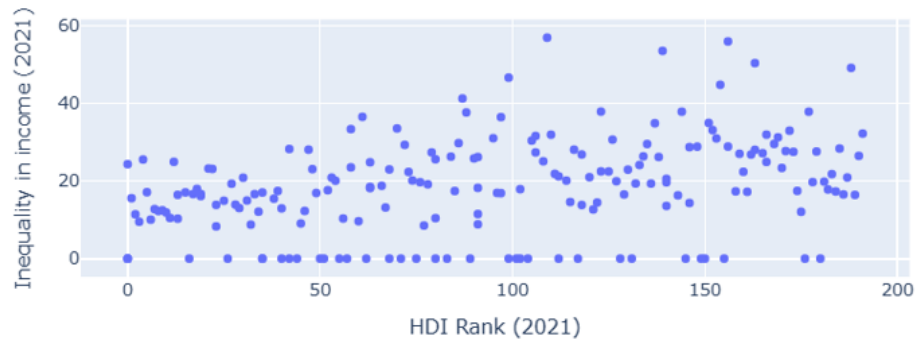


Figure 5: Scatter Plot of HDI Rank vs. Income Inequality

3. Visualizations of AI Adoption Rates and Economic Impacts

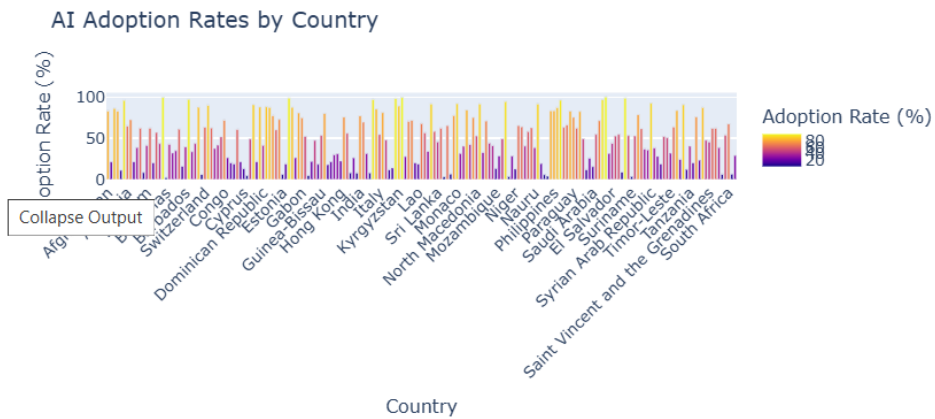


Figure 6: Bar Chart for AI Adoption Rates

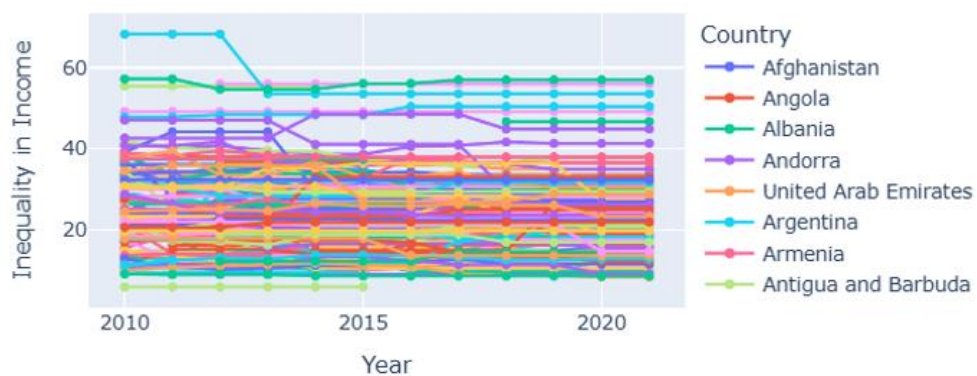


Figure 7: Line Plot for Economic Impact Over Time by Countries

CHAPTER 5

Conclusion and Future Scope

Conclusion

The study shows that understanding AI and income distributions are unpredictable and dynamical. Using technology gives options for narrowing down inequalities however, their advantages should be regulated and shared via policies and efficient worldwide cooperation. This however still leaves much room for changes in the existing levels of inequality, and this will greatly depend on the AI development and regulation systems that get to be integrated across the globe in the many years to come.

From the given data it has become evident that if well managed and regulated through relevant policies, AI continues to have a potential of defeating worldwide inequality rather than reinforcing it. This though must nevertheless be sustained with more commitment towards the drive for an inclusionary development, education attainment, and technology for all nations and development brackets.

Future Scope

The future direction of the study relates to exploring further effects of AI on income inequality across the world and to aspects that need further investigation and development. Key areas are as follows:

1. Post-2021 Trends in AI and Income Inequality:

- Exploring more recent data to see how the development of artificial intelligence and the connected policies after 2021 will deepen or reduce the increase in global income differences.
- Evaluating the potential impacts of AI assimilation in many markets over the long run with special regard to innovations such as healthcare, education, and finance.

2. AI's Role in Developing Economies:

- To understand how AI can support the missing technological links in the less developed areas that have not embraced innovation at profoundly high levels.
- Evaluating the available policies and programs that will enable the developing countries to benefit from the advanced IT tool in their efforts to grow their economy and reduce poverty.

3. Policy Frameworks for Equitable AI Integration:

- They should elaborate complex models suitable for indicating governments how to adopt AI for affordable programs.
- Develop policies to redress lowest digital literacy, and lack of access to technology and economic opportunities.

4. AI and New Job Markets:

- Research on a relationship between the utilization of artificial intelligence in automation processes and employment and required skills in different industries.
- Explore the (place of employment training programs) as a livelihood and determine the efficiency of the programs.

5. Sector-Specific Analysis

- Shift the lens towards how the adoption of AI impacts the fairness in various industries including health, learning, production, and banking.
- Analyse the roles of AI solutions in these areas for narrowing gaps concerning the region and income.

6. AI and Environmental Considerations:

- Surveying how the environmental cost of AI systems might extremely affect low-income regions.
- Calculating the generality of AI in advancing practical development alongside economic equity.

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