Department of Computing and Mathematics Computing and Digital Technology Postgraduate Programmes Terms of Reference Coversheet	
Student name:	Theresa Elohor Kosin
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External collaborator (optional):	
Project title:	Finding new normal after COVID-19: Navigating Unemployment Patterns and Emerging Trends.
Degree title:	MSc Artificial Intelligence
Project unit code:	6G7V0007_2223_9F
Credit rating:	
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ToR date:	28/06/2023
Intended submission date:	25/09/2023
Signature and date student:	
Signature and date external collaborator (if involved):	

Project Description

The COVID-19 epidemic has significantly disrupted economies all over the world, creating hitherto unheard-of difficulties in the labour market and employment environment (Sharma,A., Somanathan,R., Rohini,P., 2021) . Forging effective policies and strategies requires a thorough understanding of the effects on unemployment rates and the ensuing recovery process (Das, P., Mehta, A., 2020) . While various studies have looked at how COVID-19 has affected employment, a more thorough examination that covers a wider period and multiple pandemic stages is needed. By undertaking a thorough analysis of the monthly unemployment data for India from January 2018 to February 2023, this research project intends to close this gap.

By concentrating on monthly data, it is possible to capture the subtleties and changes in unemployment rates over time while also gaining insight into both short- and long-term patterns (Nagaraj, R., Sarkar, S., 2020) . This detailed research enables us to pinpoint the precise months or time frames that saw notable shifts in unemployment rates, which aids in our comprehension of the temporal dynamics of the labour market. We rely on a substantial dataset from reliable sources that gives precise information on unemployment rates in various geographic places in India to assure the correctness and dependability of our analysis.

We can forecast and predict the future of the labour market using the trends revealed by the statistics on unemployment. The accuracy of future estimates can be affected by unforeseen occurrences, changes in government policy, technical breakthroughs, and other uncertainties that are inherent in the forecasting process. However, attempts would be made to adopt reasonably accurate projections that help in anticipating and preparing for potential labour market eventualities by considering previous trends and employing rigorous modelling methodologies.

Aim

The aim of this research is to analyse and comprehend how the COVID-19 epidemic has affected the Indian labour market, examine the emergence of a new normal in terms of unemployment trends and generate insights to inform policy measures and strategies for promoting a resilient and inclusive labour market whilst integrating historical data analysis with forecasting tools.

Objectives

In order to achieve the aims identified, various tasks need to be completed.

- Investigate variations, oscillations, and trends in India's unemployment rates by analysing monthly data from the pre-pandemic, pandemic, and post-pandemic periods.
- Examine the disparate effects on various industries to determine the sectors most impacted by unemployment.
- Examine whether demographics had disproportionate job losses or encountered greater difficulties in the labour market and get insight into the social and economic inequities that the pandemic exacerbated.

- Determine the causes affecting changes in unemployment rates while also investigating the impact of other environmental factors that may have impacted labour market dynamics and created the new normal.
- Utilise time series analytic methods to extrapolate unemployment trends from the data at hand while making well-informed estimations and estimates regarding the trajectory of India's jobless rates in the future.

Evaluation Plan

The evaluation will be conducted using a mix of qualitative and statistical tests to assess the precision and dependability of the data collection and preprocessing, the efficacy of the descriptive and comparative analyses, and the capability of the statistical model to predict future trends in unemployment. It is possible to quantify the model's goodness of fit by using statistical tests like mean absolute error (MAE), root mean squared error (RMSE), or R-squared. The results will also be interpreted using qualitative techniques including expert reviews and critical analysis, with an eye towards determining how they might affect labour market policies and initiatives. Robustness checks will be done to confirm the results and make sure they're stable and consistence.

Course Specific Learning Outcomes

- I would oversee picking, modifying, and combining the most appropriate basic AI techniques to address the issue at hand. I would choose methods like data preprocessing, descriptive analysis, comparative analysis, and time series analysis. These methods would aid me in cleaning and preparing the data, summarising, and visualising the unemployment patterns, comparing rates across various time periods, and predicting future trends. I hope to offer thorough and trustworthy insights on the post-pandemic labour market by adapting and combining these methodologies.

- I would produce descriptive and inferential statements about the data using the proper processing techniques and models, considering variables like uncertainty, data quality, and model fitness. I will condense and visualise the unemployment data using descriptive analytic techniques, giving a clear grasp of the patterns and trends. Additionally, I will derive conclusions and make claims about the data using inferential analysis, considering elements like data uncertainty, ensuring the data quality is trustworthy, and evaluating the suitability of the statistical models employed. This method enables me to make insightful and convincing claims about the data, improving the precision and validity of the study's conclusions.

- Processing and interpreting data from various scales, sources, formats, and systems would be crucial tasks for me. To ensure effective and efficient data processing and analysis, I will make use of a variety of applicable languages, tools,

and environments. This comprises methods for integrating, cleansing, and transforming data to harmonise various data sources. I would use appropriate tools and frameworks, coupled with computer languages like Python and R, to effectively handle and manipulate data. To examine and present the results in a clear and straightforward manner, I will also make use of data visualisation tools. I can extract worthwhile insights and reach relevant conclusions in my research by effectively and efficiently processing and analysing data from various sources, formats, and platforms.

- I would concentrate on developing AI solutions using sound software engineering principles, which include reusing code, separating concerns, ensuring modularity, undertaking extensive testing, and offering complete documentation. I would be able to improve maintainability and scalability by recycling code and libraries, segregating components, and encouraging modularity. I'll put testing first to guarantee the effectiveness and dependability of the solutions I design, and I'll document the code, algorithms, methodology, and results to make them easier to comprehend and reproduce. These methods aid in the creation of reliable and superior AI solutions, which is advantageous to both my research project and the larger area of AI.

Activity Schedule

Deliverables	Tasks	Week
Research and Literature Review	Identify key research gaps and objectives for the project.	07/06 - 20/06/23
	Completion of literature review and background research	
Data Collection and Preprocessing	Collection of monthly unemployment data	21/06 - 10/07/23
	Clean and preprocess the collected data.	
Descriptive Analysis	Completion of descriptive analysis and visualization of unemployment patterns	11/07 - 25/07/23
Comparative Analysis	Comparison of unemployment rates before, during, and after the pandemic	26/7 - 16/8/23

Forecasting	Development and evaluation of time series analysis techniques for forecasting future unemployment trends.	17/8 - 10/9/23
	Document the research methodology, results, and conclusions.	
Interpretation and Reporting	Prepare the presentation slides.	11/09 - 27/09/23
	Interpretation of findings, writing of the dissertation, and completion of the research project	

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