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CSCI 3656

3/22/24

### **Numerical Computation Project Proposal**

For this project, I will use numerical computation on COVID-19 data, specifically to find a relationship between vaccination rates and COVID-19 cases.

1. The data I plan to work with are COVID-19 vaccination rates, death tolls, and case counts. With this data, I can find a relationship between vaccine rollout and the outcome of the COVID-19 pandemic.
2. The data I will use for this project comes from the source Our World In Data, which has detailed data on cases, vaccinations, deaths, etc. The data is observational, since it is a record of real-world occurrences without controlled conditions.

<https://ourworldindata.org/coronavirus>

<https://github.com/owid/covid-19-data/tree/master/public/data>

3. I feel like it would be fascinating to use Numerical Computation methods to analyze data pertinent to a world event that I lived through. Some questions I seek to answer are, “How are COVID-19 cases affected by vaccination rates?”, “How quickly are impacts in COVID-19 cases seen by changes in vaccination rates?”, “What would the pandemic have been like with different vaccination rates at different times?”, and “Are higher vaccination rates associated with fewer COVID-19 deaths and cases?”

4. A large part of my project is finding the relationship between the variables of vaccination rate and case load. Theory suggests that a higher rate of vaccines administered during a period of time would cause the rate of death to slow and the rate of new cases to reduce.
5. Some random components present could be underreporting of cases in different areas, different testing rates, and ambiguity in vaccine records.
6. Some prior research that would be useful would be papers on herd immunity thresholds, which would be replete with mathematical methods to measure pandemic spread, as well as studies on vaccine efficacy and other interventions such as masks and social distancing on COVID-19 spread.
7. Some methods that might be useful to analyze this data could be the SIR model to model spread of infectious disease, time series analysis such as Autoregressive Integrated Moving Average to forecast future trends, and regression models to isolate vaccination rates as a variable from other variables such as mask wearing and social distancing.

**CSCI 3656: Numerical Computation – Dr. Osita Onyejekwe**

	Beginning 0-4	Developing 5-6	Accomplished 7-8	Exemplary 9-10	Score
Introduction	Does not give any information about what to expect in the report.	Gives very little information.	Gives too much information--more like a summary.	Presents a concise lead-in to the report.	
Research Questions (Objective and Rationale)	Does not pose or answer any questions	Poses and answers some questions.	Poses and answers some questions and includes a few other interesting facts.	Poses and answers most questions and includes many other interesting facts.	
Methods-data description	Does not describe individuals or variables	Descriptions are confusing and lack detail.	Descriptions are understandable; some lack detail or are confusing.	Descriptions are understandable and adequately detailed.	
Methods-Numerical- Methods and software	Does not describe statistical methods used	Descriptions include incorrect methods	Descriptions include correct methods but lack detail or are confusing	Descriptions include correct methods and are adequately detailed	
Results	Results are missing.	Results are incomplete with minor inaccuracies	Results are complete with some inaccuracies.	Results are totally accurate.	
	No tables and figures.	Tables and figures are incorrect or missing	Tables and figures are correct, but are missing	Tables and figures are	

Tables and Figures		information.	information.	correct and complete.	
Conclusion-findings	Presents an illogical explanation for findings and is incomplete.	Presents an illogical explanation for findings but is complete.	Presents a logical explanation for findings and is incomplete.	Presents a logical explanation for findings and is complete.	
Conclusion-limitations and future studies	Does not discuss limitations of this research	Limitations are incomplete, no discussion of future studies	Limitations discussed, but not future studies	Limitations and future studies are complete	
Mechanics	Very frequent grammar and/or spelling errors.  No title.	More than two errors.  No title.	Only one or two errors.  Non-descriptive title.	All grammar and spelling are correct.  Descriptive title.	
Citations	None.	Incomplete references in body; incorrect format.	Correct format; incomplete references in body.	Correct format; complete references in body.	
				Total	