Computational Biology's Impact on COVID-19 Response

Abstract -- **This paper investigates how researchers across the globe have responded to the novel crisis through the use of technology and biology. As of now doctors and researchers around the world are working to combat the virus and are trying to find a cure. These specialist are using many different ways to help speed up the process of finding a treatment. Computational biology has gained a lot of attention throughout this pandemic and many great minds are working together to help with a conclusion. Me and my partner both worked together throughout this program on finding information and running source codes. The results we have come up with will contribute to the understanding of how the researchers are developing their ideas, what sources are they implementing, and how technology and biology is being used during this pandemic.**

Introduction- Throughout this paper many points regarding technology and biology will be made. The use of computation biology and how it is being applied to stop the spread of the virus will be discussed and elaborated with the current information given. The background information of each detail will be provided, and examples will be given from real world situations. The point of this paper is to inform the public of all that is being done with the use of technology to help end the spread of the virus. High performance computing will be elaborated on throughout this paper and will explain how it is being used to end the pandemic. The ultimate goal throughout this project was for the team to learn more about biology and technology together and how scientist/researchers are coming together to develop ideas, as well as the ultimate goal for the audience was to be informed and to gain knowledge on these specific areas that the media may not spend so much time discussing.

Computational biology and bioinformatics are an interdisciplinary field that develops and applies computational methods to analyze large collections of biological data, such as genetic sequences, cell populations or protein samples, to make new predictions or discover new biology. The computational methods used include analytical methods, mathematical modelling and simulation Covid- 19 and computational biology go hand in hand during these times. Many scientist are gathering together and using technology to help develop more efficient ways for testing, diagnosing and to find a cure. In some areas AI is being used to track citizens who may have a fever and alert as well as alerting others of certain hotspots for the virus. Computational methods can play multiple vital roles in the response to this situation. For example, sequencing data can be used to track how the SARS-CoV-2 virus spreads across the globe and how quickly it mutates. Likewise, algorithmic methods can aid in identifying candidate drugs for the disease. Computational approaches can even play a key role in how to best distribute limited resources for example, personal protective equipment or ventilators. As this situation unfolds, other opportunities will emerge for computation to play a leading role in combating this virus.

With the use of computational biology, scientist can use this to help assist with a practical cure to end the spread. In an article from the website mewburn.com it is stated that “Computational biology can also help with the design of a vaccine for Sars-CoV-2, Mathematical modelling of viral evolution can help to understand how a virus evolves to escape the immune system, this information can be used to be “one step ahead” of the virus in designing a vaccine. Researchers across the world are gathering genetic information about Sars-CoV-2 as it spreads, building the

data set that is needed for us to better understand how this virus changes. This will be a crucial piece of information for any vaccine that is being developed now to protect us against the virus that we will be facing by the time a vaccine is ready for mass production."

The findings so far throughout this research experience is that computational biology and high-performance computing are being used to speed up the process of combating the virus. Artificial intelligence is being used with the development of biology and technology as well. Scientist are using artificial intelligence in several ways with combatting the virus. One way is detecting who may have the virus so that the spread can be stopped beforehand. Researchers are using equipment such as drones and screenings that implement artificial intelligence and is capable of reading temperature and sending this information back to the receiver. This helps with allowing and not allowing certain people into an area.

Artificial intelligence is also being used to help repurpose drugs for covid-19. According to an article from genegnews.com it is stated that "AI is currently being used by many companies to identify and screen existing drugs that could be repurposed to treat COVID-19, aid clinical trials, sift through trial data, and scour through patient electronic medical records (EMRs). The power of AI in COVID-19 is that it is being used to generate actionable information—some of which would be impossible without AI—much more quickly than before." These great scientist are using artificial intelligence to help generate a more sophisticated drug that can be used during the covid-19 pandemic. This can speed up the process by a great deal if implemented correctly.

Conclusion- Throughout this research much insight has been gained through the use of finding and summarizing data. Many new ideas have been brought to the attention and have been utilize during the research. Ai, Computational biology and high-performance computing are the main usage for combatting the virus through the use of technology. In today's society many great minds are coming together in various fields to help bring knowledge and come up with a solution. All over the world technology is being implemented in many ways to test and debug different results that are being made. It will only get better as time goes on and the development will only become superior with the different fields bringing in data.

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