Outline Template

Introduction: In the fight against the COVID-19 pandemic, the application of machine learning algorithms using distributed cloud computing infrastructure can be a powerful tool in the creation of monoclonal antibodies able to provide immunity to the virus.

Body Paragraphs:

Supporting Evidence Body Paragraph #1

Hifumi et al. (2020) have shown that using machine learning algorithms, genetic researchers in a lab setting have had success transforming normal antibodies to their corresponding catalytic antibody through the deletion of the PRO95 gene. It may be possible to apply this research in the fight against the virus SARS-CoV-2 by leveraging artificial neural networks.

Supporting Evidence Body Paragraph #2

Folding@Home (2020) has shown that the capability exists for individuals to donate their computer’s CPU and GPU resources to assist researchers in their study of viral protein folding possibilities using artificial neural networks.

Supporting Evidence Body Paragraph #3

Amazon provides a cloud-based Platform-as-a-Service (PaaS) tool called SageMaker with user-friendly interfaces allowing individuals to research, create, and train their own machine learning algorithms in a managed setting (Hudgeon & Nichol, 2020). Even novice data scientists can get started into their own research into viral protein folding possibilities using training data sets (supervised machine learning), or even letting the algorithms themselves find relationships in the data without pre-labeled inputs (unsupervised machine learning).

Supporting Evidence Body Paragraph #4

Chen & Yang (2017) describe in-depth the landscape of possibilities for machine learning, artificial intelligence, and cloud computing. The data scientist is limited only by his own creativity to create machine learning models for any imaginable situation. For this particular use case, supervised algorithms like k-Nearest-Neighbour, Naive Bayesian Classifier, and Artificial Neural networks might be useful and unsupervised techniques such as k-Means Clustering, Dimensionality Reduction, and the Hidden Markov Model could be used to discover associations in the data.

Counter Argument Body Paragraph #5

Mohamed & Mohamed (2017) describes the benefits and drawbacks for researchers using traditional cloud-based Infrastructure-as-a-Service (IaaS) platforms like Google or Amazon on a fee-based system, versus getting these resources for free using a distributed processing power donation system. Researchers do not have unlimited budgets and the cost savings which are possible using this new information paradigm outweigh any drawbacks that are presented.

Conclusion

As many Americans are staying at home to try to contain the COVID-19 pandemic, these individuals are able to aid in the fight against the virus by donating the processing power of their computers and other devices to researchers who desperately need the resources. Individuals who are interested in data science can take this a step further by using PaaS to research their own machine learning algorithms in an effort to develop catalytic monoclonal antibodies. There is something that nearly every American can do to fight this virus and an individual’s actions can make a substantial difference to this cause.

References

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