Biological systems, animal, and microorganism behaviors have inspired multiple algorithms. For instance, the optimization technique, Particle Swarm Optimization (PSO), have been inspired by behaviors from bird flocks/fish schools and the probabilistic technique, Ant Colony Optimization (ACO), is based off of pheromone-based communication of ants (Marinakis, Marinaki, & Dounias, 2011). Another example of this is neural networks, a class of computational methods influenced by the activity of neurons in the brain (Navlakha & Bar-Joseph, 2011). Lastly, the Pigeon-Inspired Optimization (PIO), that has been influenced by the behavior of a swarm of pigeons, have been found to successfully solve combinatorial problems like the Travelling Salesman Problem (Zhong, Wang, Lin, & Zhang, 2019).

In biological research, computer algorithms are used to collect, process, and organize data. Genetic Algorithm (GA) can be applied to complex data systems and optimize data structures, but when combined with ACO, they can create a more efficient algorithm to analyze larger amounts of bioinformatic data. Sun's (2022) experiment on gene sequence alignment found that combining these algorithms results in a faster and more accurate analysis and calculation of biological information.

Algorithms also have several applications in the medical field, including predicting the probability of developing diseases using Machine Learning (Holzinger, Keiblinger, Holub, Zatloukal, & Müller, 2023). Another important application is creating antigens for neurodegenerative disorders such as Parkinson's disease and Alzheimer's disease, which are caused by protein aggregation. By using computational algorithms, aggregation prone regions (APR) can be identified and studied to create biotherapeutic proteins that can reduce aggregation susceptibility (Santos, Pujols, Pallarès, Iglesias, & Ventura, 2020). Besides the medical field, Machine Learning (ML) algorithms can also benefit the agricultural industry by predicting the environmental changes that can impact the crop yield (Holzinger, Keiblinger, Holub, Zatloukal, & Müller, 2023).

Biotechnology also has the potential to reduce Food loss/waste (FLW), a major global problem with an annual global economic cost of $2.6 trillion USD (Fao, 2014). According to Mouat (2022), FLW can be reduced by either transforming them into something useful or extending their shelf life using genetic modification. However, more research is needed to understand the environmental impact of FLW-prevention biotechnologies to ensure that they are sustainable and do not have unintended negative consequences.

Algorithms have provided new potential solutions to fields of research and applications such as computer science, medicine, agriculture, and more. By integrating biological systems into computational and technological innovations and using biotechnology to create sustainable solutions, many breakthroughs in research can be made.

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