Revolutionary Algorithm

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Evolution of species as stated by Darwin states that "**Survival of the fittest**". This means that only the best and the fittest among all the species in the entire population pool survives. That is goes for mutation and recombination. Evolution in nature occurs in all the species.

Any species in the entire population pool is defined by two traits:

i) **Phenotype**: Traits that define the physical appearance of an individual in a species. E.g. hair color.

ii) **Genotype**: Traits that define the genetic behavior of an individual. E.g. Boy or Girl.

Phenotype of an individual can be say a no. 18. Then its Genotype will be binary representation of 18 i.e.10010.

Evolution in nature occurs with the help of mutation and recombination among the individual of a species in a population pool. Mutation occurs in a single individual whereas Recombination occurs among two parent individuals within the same species which gives rise to a new offspring. The new offspring thus created is now selected based on its fitness among all the newly created offspring in that species. This **Variation** (mutation and recombination) and **Selection** is what gives rise to evolution among individuals in a species. And this evolution is what makes us unique in surviving all the way to this time now!

Evolutionary Algorithm uses the concept of evolution that occurs in nature to select a random species from the population pool and then apply the **Variation operators** (Mutation and Recombination operators) to the **Selected** species and then the newly created offspring is then selected based on a fitness level. The best among all the possible candidates is used for the later iterations in the algorithm. This process of evolution is repeated until a satisfactory fitness level is achieved.

The Evolutionary Algorithm applies minute changes to only the genes of a species and ignores the physical traits i.e. the entire Evolutionary Algorithm takes place in the Genotypic space and does not considers the Phenotypic traits of an individual. This brings us to the new concept introduced here:

The Revolutionary Algorithm

The Revolutionary Algorithm is an extension of the existing Evolutionary Algorithm as discussed above, but in contrast it takes into consideration the behavioral characteristics of the species as well i.e. the phenotype of the species. The major idea behind the realization of this algorithm is the extinction of the species!

Yes you heard that right! Reason for the extinction of any species is majorly considered a reason of natural calamity. But that is not always the case, take for example the extinction of Dodo, it is generally believed that the main reason behind the extinction of Dodo is Humans. But one interesting fact that led

to its extinction can be argued is the reason of it having no fear of humans! Since it had no fear of Humans it became an easy prey for we human to eat and that eventually lead to its extinction.

Now a basic question arises it that**, whose fault was it in the extinction of the Dodo?**

Some can argue that it was we humans who mass hunted them for our own need while others can argue that it was the inability of Dodo to evolve properly (like running fast) that led to its extinction. Well we may never know, given they are extinct now.

This example gives rise to a major issue here, **Can the extinction of a species be linked to its behavioral attributes i.e. its phenotype?**

This is what this revolutionary algorithm aims at finding. In our earlier example of Dodo a major factor can be the reason of mass hunting by humans than its inability of running of protecting itself, so now to better understand this concept let us look at the most beloved and argued topic in the field of extinction, the **Extinction of Dinosaurs!**

- **Mesozoic Era**

While a lot of thesis and research exists in this field one thing that all can certainly agree upon is that none of them completely explains as to what exactly led to the mass extinction of dinosaurs and that to at such a large level!

Now certainly in this case we humans are not to be blamed, as seen in the case of Dodo. Some scientists argue that natural calamity such as volcanic eruption could have caused this mass level extinction, while some argue that a meteorite hit the earth and caused a series of changes throughout the globe which no dinosaur could escape and thus caused this mass level extinction. There are several reasons given by several scientists. But one important question that arises from this discussion is that:

"If such a huge level activity occurred which lead to the extinction of all the Dinosaurs, then how come life still survived on earth and here we are living at the moment without the fear of any such activity to occur again?"

This leads to the last and the most important topic in the concept of Revolutionary Algorithm: **Could it be the fault of the dinosaurs itself that lead them to the path of extinction?**

Looking at the food chain at the time of Mesozoic Era one can unarguably say that Dinosaurs where at the top of the food chain. Whether it was herbivorous or carnivorous, whether it was Brachiosaurus or Everyone's beloved T-Rex (Tyrannosaurus) all went extinct!

So what happened? And why did everyone went extinct at the same time and not even one of them survived (in its original form) for us to see!

Well certainly no one could answer it with conformity for sure but everyone would certainly agree that something happened! Something extreme! And No one was knowing!

Coming back to the concept of Revolutionary Algorithm, where we considered the phenotypic trait of an individual in a species, could it be that dinosaurs did something wrong? Something horrible without realizing that their end was coming near! Well it can't be said with certainty but that's a possibility (even maybe 10%) but there is a possibility! This raises some serious questions in the Mesozoic Era, some of which may have been answered while some of them not.

- **Holocene Era (Human Era)**

Now coming back to the present time Holocene Era or Human Era (HE). We humans perform various tasks in our day to day life, some are insignificant as compared to the earth as a whole such as eating, bathing, sleeping, washing, cooking etc., and some are significant as compared to the earth such as use of atomic energy, mass killing of human beings (terrorism), inappropriate use or distribution of resources, etc. the list is never ending. Among these two broad classification of our day to day routine the one of which we should be most aware of is the one that affects the planet as a whole!

We humans are in the top of the food chain in our Holocene Era, we have the highest amount of power compared to any other species in the planet right now. Ranging from Blue whales to a small ant we humans are capable of detecting and hunting any species we want. This throws a great resemblance to the dinosaurs in the Mesozoic Era.

Our day to day routines not only affects us as but also affects our environment, our society and our Planet! That is the phenotypic traits of we human beings is ever increasing, from the industrial revolution to now we have seen an epic increase in the skill set of humans. In not only just one particular field but all the possible dimensions we can imagine.

In the field of computing, where we have advanced from the discovery of first transistor to the use of that transistor at a very small level in a computer. And from the use of that computer to the development of self-learning algorithms or say Artificial Intelligence.

Humans have also grown at an alarming rate in the field of weaponry, from the advancement of the use of arrows and swords in a war to the use of nuclear weapons in the war scene.

The most surprising thing is that both the fields have their importance in the evolution of humans in the times to come. For example, AI is seen as the next evolutionary thing in the field of technology, which can be used to serve us better and function more productively, whereas advancement in the field of weaponry helps us in securing our borders and making us feel safe in our homes.

These two advancements are no doubt going to help us in our process of evolution.

The skill sets that we humans have developed over the years have made us more efficient and has no doubt resulted in an increase in our phenotypic traits.

But one basic question that arises here is that,

- **What happens if we use these great powers against each other?**
- **What happens to our home planet *The Earth* as and when we continue using these powers that we have?**
- **Where are we heading to with all these powers and energies that we have accumulated?**

- **Is there any probability that we humans are going to be the reason of extinction of our species and the end of Human Era?**

Revolutionary Algorithm answers this question! It takes into account the phenotypic traits of all the individuals in a species over all the generations and creates a dataset of the traits. It also considers the genotypic traits as discussed in EA. It takes into account which behavior of an species can possibly lead to the termination of its race and which can lead to enhancement of the species in the entire population pool.

Thus, with a large dataset created using previous results of different species and the reason of extinction (reasons attributed to the phenotype mainly) we can use Revolutionary Algorithm to answer one of the most interesting questing revolving in this Era!

What can lead to the Extinction of The Human Species from this Planet We Call *The Earth*?

Sources:

- www.google.com
- www.wikipedia.com
- Introduction to Evolutionary Algorithm by A.E. Eiben and J.E. Smith