Simulated algorithms for lives

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Abstract

This paper summarizes the characteristics of neural networks.This paper focuses on challenging the sudden randomness [1] of gene mutation and explaining the active source of mild gene mutation.In this paper, a life algorithm framework that simulates the changes of genes by neural networks combined with genetic algorithms is taken as an example to show that genes can maintain overall stability and actively update at the same time, presenting a random exploration that maintains relatively small scope in general, and thus species evolution [2].

1 Introduction

This paper summarizes the characteristics of neural networks.This paper focuses on challenging the sudden randomness [1] of gene mutation and explaining the active source of mild gene mutation.In this paper, a life algorithm framework that simulates the changes of genes by neural networks [3, 4] combined with genetic algorithms is taken as an example to show that genes can maintain overall stability and actively update at the same time, presenting a random exploration that maintains relatively small scope in general, and thus species evolution [2].It is necessary to keep the exploration of randomness small.

This article breaks the shackles that genes determine everything in life. Genes and neural networks are both important. In addition to innate genes, people's ability to learn, update, shape themselves, and explore is particularly important.

This paper points out the importance of neural networks in the evolution of species. Different from the view that neural network is only the intelligent organizational structure of human brain, this article extends the above view, neural network is also an important intelligent structure of cells, and neural network is also an important intelligent structure of organs.

2 Background

Often people think that genetic mutations are completely random [1]. However, there is a lot of evidence that gene mutations are not completely random [5–7].People's understanding of the evolution of species is only limited to the role of natural selection. The methods of species evolution introduced in this paper include selection (selection includes natural selection[8]).It is widely believed that neural networks merely mimic the neural connections of the brain [3] and possess the ability to learn and intelligence.In the past, the combination of genetic algorithm and neural network is often to explore the new structure of neural network or optimize the parameters of neural network [9], but the role of neural network in genetics is not described, and the correlation between genetic algorithm and neural network is not described.

3 Characteristics of neural networks

Axiom. ***1:*** *In the environment, neural networks can learn, explore, and utilize knowledge.*

(The neural network here refers to the general name of neural network + classification, autoregression, reinforcement learning and other methods; Because these are interacting with specific types of data and labels, distribution of computing resources, etc.It extend from data to environments, which can be broadly understood as the input to neural networks being the environment[8])

Assume there is :

Axiom. ***2:****The way species evolve is simple and unique.*

(Assuming there are only a limited number of evolutionary methods and ignoring the less concise variants, these can be combined into a tool set.) (Life also includes physical, chemical, and other components, and the discussion here focuses on the simplest methods of species evolution.) Historically, advanced life, such as animals, has evolved step by step from microorganisms, and evolutionary methods control all of this.

Theorem. ***1:*** *Neural network organization can be nested by attributes.*

As W or X or b, the neural network is nested layer by layer into the formula

$$Y = \sum_{i=0}^{K} W_i \cdot X_i + b \tag{1}$$

, and the resulting neural network is still a neural network.

Theorem. ***2:****Neural networks are the evolutionary method of species.*

Natural selection acts as a filter and is just a component of neural network learning algorithms [8]. Suppose that the method of species evolution is L, the neural network is N, the complete neural network method is W, and natural selection is R, then

$$R \subseteq N \subseteq W \subseteq L. \tag{2}$$

.(And by Axiom 2)

Corollary. ***1:*** *Under certain conditions, according to the characteristics of the internal structure of the neural network, multiple neural networks or digital variables can be used as nodes and assigned different weights to form a neural network organization.*

Corollary. ***2:*** *Cells organize into different organs, which then organize people. (By Theorem 1 and [8].)*

Corollary. ***3:*** *Neural networks in different environments can learn different knowledge and utilize knowledge by changing their own parameters.*

Corollary. ***4:****Neural networks at the cellular level, the organ level, and the individual level learn the knowledge at the corresponding level and use the knowledge.*

Corollary. ***5:*** *It is possible to infer the properties of organizations such as countries or companies based on the properties of neural network organizations or biological isomorphisms.*

Corollary. ***6:*** *The behavior of human beings and cells has a common behavior of neural networks.*

Corollary. ***7:*** *A cell's neural network evolves genetic material.*

Assume there is :

Corollary. ***8:*** *A cell's neural network directly or indirectly alters genetic material.*

Observed. ***1:****Neural networks have the ability to adapt to the environment and the laws of physics and chemistry by changing themselves by design.*

Observed. ***2:****Although there is still room for improvement, the intelligence and knowledge of neural networks at the current moment are limited.*

Observed. ***3:****The adaptability of Neural networks per unit time is limited.*

There is a limit to the scope of learning and updating parameters each time. For example, parameters are limited to a certain range, normalization, gradient truncation, error truncation, strategy ratio truncation.

Observed. ***4:****Organisms use the knowledge they learn and explore to shape themselves.*

4 Mutation is advantageous, neutral, or deleterious discussion?

According to Corollary 6 3, humans and cells share common characteristics of neural network behavior.Just like people are all looking for a good future and hope, but they choose different strategies and plans, but most people are ordinary in the society, a few are very successful, and a few are completely headed for failure.When the environmental adaptation problem is modest, most succeed, which is a mild neutral mutation.When the environment is harsh and the problem is difficult, success is difficult, you need to have wisdom, understand yourself, accumulate enough knowledge and resources, etc., you also need to have the courage to face risks and make strategies and plans with a relatively high win rate, etc., in order to succeed.The failure of the mutation, sometimes even more than the original gene, is not a lack of effort, nor is it a completely random attempt; Of course, when you have no idea how to deal with it, you will definitely try all kinds of random things or do nothing.

According to Corollary 83, there is the following analysis.

1. The degree of intelligence, knowledge and resources of the cell's neural network are limited at the current moment, which sometimes makes wrong judgments and decisions, and then presents harmful genetic mutations. Assuming that the neural network of single-celled organisms is less intelligent and knowledgeable than that of multicellular organisms, or that the accumulated resources are not enough, then in the face of the same difficult environment, the harmful probability of single-celled gene mutations is definitely higher than that of multicellular cells.
2. With the aging of cells or the stimulation of malignant environment and huge competitive pressure, it may damage the neural network and computing function and action ability of cells. Among them, the aging cells will face great survival pressure, confused intelligence, poor action ability, and sometimes make harmful genetic mutations. In a malignant environment, a cell's neural network often has to deal with great difficulties by forcibly adjusting strategies and behaviors, resulting in unsuitable for the original mild

> environment, showing that most genetic mutations are harmful. Extremely stressful environments lead to too much attention to stress, rather than facing difficulties, which may result in irrational responses. Just because the end result is bad doesn't mean the cell isn't trying to get better; Because from the cell's point of view, he is only able to solve the problem as a criterion.

Therefore, we should exclude aging or malignant environments that cause great stress, and only consider the statistics of gene mutations in appropriately mild environments, and distinguish the statistics of gene mutations in different intelligent organisms such as single-celled and multicellular organisms.

In the general environment and in the face of relatively simple difficult situations, that is, in the mild case of statistics, the number of neutral mutations [10] in biological cells with better intelligence and knowledge is often greater than that of harmful mutations, indicating that the overall direction of mutations is to protect themselves as much as possible and strive for a good direction. Only the benefits of mutation results, which are not obvious in the short term, show a neutral mutation. From the perspective of a longer evolutionary history, the accumulation of these mutations is in the direction of progress.

It can be known from the above that historically, researchers have not been able to describe a stable mathematical simple distribution function curve by statistical distribution of harmful, neutral, and favorable gene mutations, or statistical transformation rate, due to various environmental changes and analysis of different species [11]. Unable to find a pattern, the researchers came to the wrong conclusion about random mutations.

Therefore, we must start from the perspective of fundamental principles to observe the phenomenon caused by gene mutations, so that it is easier to get reasonable causal logic.Just looking at the distribution of mutations is not a good conclusion. You have to start from the point of view of the neural network of the cell, and you need to verify that it's moving in a direction that's good for itself; Further tests to see if the mutations are random or active.

Compare the genetic mutations of the same life, a billion years ago, to the present: Humans evolved from microbial life to what we are today. So the progenitor cells of humans a billion years ago were roughly as intelligent and knowledgeable as today's bacteria and viruses, and the distribution of genetic mutations was about the same. In their respective stable environments on Earth, humans, on the whole, have a smaller probability of harmful mutations and an increased probability of neutral mutations compared to ancestral cells. Compared to the original cells, humans have made progress.

Compare the frequency of genetic mutations in different environments of the same life: Compare the distribution of bacterial viruses in different environments today, for example, the frequency of genetic mutations in mild environments is less than the frequency of genetic mutations in harsh environments. At this time, the probability of harmful gene mutations in harsh environments is greater, and it does not mean that bacteria and viruses are regressed. It's because bacteria and viruses are trying to change and adjust themselves.

From the above, genetic mutations are not random.

However, it can not be directly inferred that the gene mutation is caused by the active change of the cell's neural network. Although the Corollary 83 fits the above analysis, further identification of the neural network from the cell is needed to strengthen the confirmation.

5 To form a larger network

When the knowledge and intelligence learned by the neural network is not high, it can be organized into a larger neural network according to nested rules to enhance its intelligence. For example, when the knowledge and intelligence learned by the neural network in a single cell is not high, there is often no huge gap in ability between cells. However, organized into larger neural networks, the large neural network feeds back into the neural network in each cell by means of survival in the ecological chain that is superior to that of a single cell.

Just as the knowledge of the larger nations as a whole is immense, man can only learn the small part of the knowledge that he comes into contact with. There is often no huge gap in ability and intelligence between individuals, but individuals can get greater advantages than a single individual in a good large organization, and naturally organize into a large neural network [8].

Can the knowledge and intelligence of the large neural network and the knowledge and intelligence of the cellular neural network be transferred to each other? From the person's own sense, the human body does not feel the microscopic knowledge of cytology, and the cells do not transmit this knowledge to the human brain. What the body learns is not transmitted to the cell. The two are separated by knowledge. If there is a way to construct the knowledge transfer bridge between the cell and the human brain, the cell and the human brain will further enhance their intelligence.

6 Sexual reproduction and asexual reproduction

Both are biological reproductive strategies. Neural networks play an equally dominant role in genetic mutations in sexual and asexual reproduction. But sexual reproduction allows nature's neural networks to expand wider and deeper. But asexual reproduction tends to have a strong reproductive capacity and a shorter reproductive cycle. This paper discusses the combination of genetic algorithm and neural network for sexual reproduction, which is of more typical significance.

7 Simulated algorithms:Neural network combined with genetic algorithm

Design the simulation calculation method of biological individual, the important components are as follows:

1. Genes that record key information about the human body
2. Genetic algorithm
3. Neural networks

For more actions with more steps to interact with the environment, reinforcement learning with neural networks is more appropriate.

7.1 What acts as a gene?

Although we are not sure exactly what it is, several methods are supposed to be listed here for verification and falsification of subsequent work.

1. Chromosomes and neural networks do not separate. Using two sets of VQVAE containing vectors as two chromosomes, the neural network retrieves and updates the genes of the chromosomes. The two sets of embedded vectors are crossed and interchanged. The variation is accomplished by gradient updating of the neural network.(It is difficult to ensure that the range and change value of gene renewal are small, unless the time window is particularly short, and the time window for the transformation of the progerm cell into the gamete changes)
2. Separation of chromosome and neural network. A neural network is used to maintain and update two independent vectors as two chromosomes. Two independent vectors are crossed and interchanged. Variation is accomplished by neural networks performing certain tasks. The smaller range and probability are determined and controlled by the neural network.
3. Various structure, function and parameter information of the neural network at all levels are encoded into two vectors, which are used as two chromosomes. Chromosomes are crossed and exchanged. Variation is obtained by gradient updating of various structure, function and parameter information of neural network.
4. It could be the objective function of each stage. Fertilized egg growth, metamorphosis development, whether there are continuous stages of the process or the objective function.
5. It could be steps, procedures, and rules. Cell life activities and fertilized egg development must be carried out in strict accordance with the steps and rules described by genes.
6. It could be knowledge, the principles of the microcosm. It's like a library book.The knowledge that the neural network in the cell learns and explores the physical chemistry and other principles at the microscopic level and can use them; the knowledge that the organ learns and explores the physical chemistry and other biochemical functions at a higher level; the knowledge that the individual organism learns and explores at the individual level. Are inseparable from group learning and exploration, as well as division of labor cooperation. Knowledge at the cellular and organ levels will be recorded

in genes. And individuals record knowledge into books, audio, video and other information carriers. Since the beginning of life, today's cells, organs, and human knowledge have been updated and increased a great deal. Cells can constantly change and renew their abilities, and the cells of today are different from the cells of the past. Then the knowledge of genes may also change with the ability of the cell, and there may be a lot of old knowledge that is not needed.

7.2 The variation could be from the following sources

1. it is possible that the neural network actively controls the mutation of a gene given to a chromosome with a very small probability. When the direction is not known at a local point, random direction variation, beamsearch, or Monte Carlo method may be used to experiment.
2. it is possible that random variation in chromosomes is passively presented by the renewal of neural networks.

7.3 Exploratory sources of genes

1. Genetic algorithms are sources of variation
2. Cross recombination to form gametes
3. Males and females search for mates in larger groups
4. The male and female further combine gametes (often one of a large number of gametes)

7.4 Changing environmental factors

External environmental influences, or internal optimization of the body, and other tissues and organs of the body may affect the execution of cross, recombination, and mutation tasks of the neural network through blood transmission signals.

7.5 How does the genetic information of gametes and the next generation remain stable on a large scale

1. Because the neural network algorithm will be updated in the training process, the parameter results after multiple training are inconsistent, showing the characteristics of instability. If the network is executing, it can try not to deviate too far from the original model by contrasting it with the genetic sequence of the original cell, or by contrasting the execution strategy of the network (e.g. Kullback-Leibler Divergence). This keeps the gene stable.
2. The variation with small range and small probability is determined and controlled by the neural network. In this way, the overall stability is maintained while the randomness of the local small probability is maintained.

7.6 General procedure:

In reality, the neural network will not only have one output, it may be able to output multiple at the same time, and the objective function may be more complex.

1. As a high-level neural network, the human body feels the external environment, interacts with the outside world, and feeds back to the human body itself, which indirectly affects the cells of the human body.
2. The cells of various differentiated tissues of human nerves, indirectly or directly affect the production of germ cells or gametes. At the same time, the corresponding neural network of the germ cell or gamete updates the gene.
3. The renewal of genes, through crossover, exchange and other operations, to produce gametes.
4. Male and female members of a group choose each other.
5. The male and female mate successfully, create an embryo, grow and give birth. A new generation of individuals is created. The survival of individuals and organizations is also through natural selection.
6. the new generation of individuals repeat the process of 1-5, thus iterating continuously.

7.7 Discuss

In this way, the stability of genes can be guaranteed, in accordance with Gregor Mendel's law of genetic separation. It also ensures the continuity and gentleness of the mutation. It is also consistent with organisms adapting to different environments and changing some of their own characteristics. Under the framework of this life algorithm, a simple and reasonable explanation can be provided for prions, which are organisms but have no genes, and the possibility of explaining the source of immune ability of the immune system can be provided.

According to the nesting characteristics of neural networks, the neural network framework of genetic algorithm can be continuously iterated and evolved automatically in various neural network applications such as robots, aircraft, vehicles, autonomous driving, pictures, videos, voice, language, text, logistics sorting, recommendation system, medical treatment, medicine, intelligent customer service, code, operation and maintenance, and search. Continuously improve its performance.

7.8 Compare genetic algorithm and neural network

1. They all have 'select'.
2. Genetic algorithms in the next generation of genes, it is possible to organize into neural networks of companies, countries and other organizations.
3. Genetic algorithm cross-recombination increases diversity and exploration ability; Asexual reproduction is not cross-recombination, but it is selected.
4. Cross-recombination fuses grandfather genes, and genes are constantly renewed, selected by both parents, and combined. From a population point of view, if the parameters and structure of the neural network are taken as part of the gene, the sexual reproduction strategy greatly expands the width of the network compared to the obstruction of gene exchange in the individuals who adopt the asexual reproduction strategy.

7.9 Guess 1

In multicellular organisms, DNA is only partially functional in different cells, so presumably mutations will only occur in those segments of DNA that are functional in each cell(So maybe a single cell has very few mutations, but a large number of cells have a lot of mutations combined); There may also be shared sequence fragments. The cell needs to work, and when the environment changes persistently or certain threshold conditions are reached, the cell needs to conserve energy and complexity and has to change these active DNA segments, just as a neural network updates parameters, updating the information data on the DNA sequence.

A mutation in a shared fragment can affect the normal function of other cells that share the fragment, and there is a possibility of ignoring one or the other.

7.10 Guess 2

Inherited genes, as well as damage inside cells, may contribute to both aging and cancer. Oocytes can remain dormant in the ovaries for up to 50 years, and through dormancy, the cells' neural networks, computing functions, and mobility are kept in the most dynamic state [12], thus ensuring that the child born is also the most dynamic. We know, corollary 8, that the cells of the mother and the cells of the child are equally intelligent and knowledgeable. If the algebra is not very different, the intelligence and knowledge of the body's somatic cells are equivalent. By comparing the rate of cancer in children and the elderly, it can be seen that fresh cells are one of the reasons for better health. So is it genes, is it other parts of the cell that cause cancer? Whether it is aging, malignant stimulation, damage to the neural network and computational functions, the ability to act, will increase the production of errors and update this knowledge into the genes, more likely to lead to cancer. Genes are genetic information, perhaps cognition, perhaps steps, procedures, rules, etc., because the intelligence and knowledge of the cell's neural network are limited, then the genes left behind by changes may be harmful, or hidden shortcomings. (This is also why close Cousins tend to produce unhealthy offspring. But if there is a chance to be homozygous over many generations, the cell's neural network will constantly try to correct the defect.) When people live in a special environment, it will induce the neural network of cells to change genes; According to the central law, the physiological activities of other organs of the cell are disrupted, and may further develop into cancer.

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