Algorithms for constructing society organizations, and also for lives

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Abstract

In the past, society organizations (governments, companies, etc.) relied on natural experience, without a solid set of mathematical logic ways to explain how to organize and optimize their organization.This paper compares the structure of social organization with the structure of neural network,showing that the structure of social organization simulates the structure of neural network. Social organization is a neural network nested with human brain nerves. By extension, plants, animals, people and all living things form a huge neural network. This huge neural network survives on Earth in a way described in Darwin's evolution, and lives follows neural network learning algorithms which is more than Darwin's. By dividing Deep Learning into two parts: **Neural networks** and **Learning algorithms**, it is discussed that Neural networks are extremely adaptable, and the training curve in the process of Learning algorithms illustrates Darwin's evolution. The main elements of Darwin's theory of natural selection include: overbreeding, the struggle for survival (also called the competition for survival), heredity and variation, and the survival of the fittest [5].Looking at the elements of the neural network algorithm, it can be found these traces that they are same in many ways and showed a list to compare with them.Learning algorithms are to make the model fit the objective function, while all the organisms on the earth are to fit some function on the environment, and this function can make the organisms adapted, and the higher the degree of fitting, the more adapted. The Morphology and knowledge of all creatures are just to fit this function.

1 Introduction

In the past, society organizations (governments, companies, etc.) relied on natural experience, without a solid set of mathematical logic ways to explain how to organize and optimize their organization.This paper compares the structure of social organization with the structure of neural network, showing that the structure of social organization simulates the structure of neural network.The forms of various organizations in society shows extremely powerful intelligence. By dividing Deep Learning into two parts: **Neural networks** and **Learning algorithms**, it is discussed that Neural networks are extremely adaptable, and the training curve in the process of Learning algorithms illustrates Darwin's evolution. And show a list to compare the neural network algorithm with Darwin's evolution.

2 organizations simulate neurons

Why is it said that social organization simulates neural network structure? We can compare their structures. M-P model, relu is an important component of neural network, which needs to be paid more attention to.

2.1 Election vs. M-P neuron model

In the election process, if there is a candidate named as A, ordinary voters vote for A. Let X_i be the voting value of the ith individual for A (vote is 1 or 0), then the number of votes obtained by the candidate is

$$Sum(A) = \sum_{i=0}^{K} X_i \tag{1}$$

In human history, there has been a debate about whether everyone has the same right to vote, because everyone has different abilities, the number of their voting rights X_i should be different. And each person in different industries, environment, knowledge, moral character are different, and the weight of the vote W_i is also different. Therefore, the method can be extended that the number of votes received by the promoted candidate is

$$Sum(A) = \sum_{i=0}^{K} W_i \cdot X_i \tag{2}$$

Thus, it can be seen that the election process and the M-P neuron model [1] is similar. And the process of selection by region is similar to the process of convolution.[2]

2.2 Selection vs. ReLu

In daily life and work, people usually need to take part in learning and education, take part in examinations, participate in various competitions and so on to obtain the qualification of the best through selection. By selecting and selecting talents at all levels, some talents exceeding a certain level will be selected and appointed.

This process is the same as ReLu.[3][4]

Relu is more suitable than natural selection [5] in terms of words and methods. There may be better ways to fit here in the future.Natural selection is only a part of Neural networks, which work with Learning algorithm.

2.3 Multilayer

Often in social organizations, a mixed operation of election and selection presents a multi-level alternating pattern. The operation is consistent with the structure of today's popular deep neural networks.[6, 7]

2.4 Organization plan goal vs. Loss function

In social organizations, the performance results of the organization are usually inconsistent with expectations. In this case, it is often necessary to provide feedback to the internal organization through the difference between the performance results and expectations. In this case, it is often necessary to provide feedback to the internal organization through the difference between the performance results and expectations. This is very similar to the loss function at the end of the deep neural network.

However, some organizational plans in reality are not errors between performance and expectations, but only have some targets, and these targets do not have a good built-in mechanism to adjust, so it is difficult to directly achieve the target. It's not that we can't achieve the goal, but it's more difficult. Without smooth adjustment step by step according to the error, it's more difficult to learn.

In reinforcement learning, the final cumulative reward is similar to the goal, which is to expect the final reward. However, reward is often sparse or even delayed in the interaction between the individual and the environment, which is similar to the nature of the target.

In the deep learning task of image target detection, the internal mechanism of proposal box such as anchor is adopted to make the regression more fast and smooth learning.[8]

The organization of the plan targets, not only to consider the poor expectations of one aspect, but also to consider the impact of more aspects (such as the geographical transfer payments in a national policy, etc.); Similar considerations are often made when designing loss functions in deep neural networks.

2.5 Forward process

In social organizations, some departments collect data and then report it to superior departments. Departments at each level analyze and integrate data and information. Iterate and report to the superior department.

The process of information analysis and information integration is usually through selecting the best people, who receive the information to be processed by the human brain (brain neural network), and then report the data information through the social organization structure. And social organization mimics neural networks in the brain, so that neural networks are nested within neural networks. We can think of them together as structures that are still neural networks.

However, people in social organizations sometimes terminate the forward process at the middle node of the network due to their high degree of intelligence. Some information is not important enough to stimulate further reporting of data to superiors (there are also cases of misjudgment), stopping the forward process. Some information is important, but a node in the middle of the network analyzes the information, terminates the forward process, and has the right to directly generate the expected difference and carry out the reverse process.

However, in the current artificial neural network, the intermediate node often has no right to directly reverse the process. In general, the reverse process is carried out through the loss function of the last layer. Of course, there are such examples in deep learning. The intermediate node of object detection ssd [9] can be reversed, but it is carried out at certain fixed nodes. However, the power node of the reverse process in social organization is more flexible.

2.6 Organizational feedback vs. Backpropagation algorithm

In social organizations, it is usually the toppest think tank analysis team of the organization that gets the difference between the performance result and expectation and feeds the difference back to the Lower level node of the next layer of the organization. The Lower level node of the next layer adjusts the professional behavior of each node according to the difference, so as to expect better behavior in the future. In this way, the organization of continuous feedback adjustment from the top down is consistent with the purpose of the back propagation algorithm[10, 11], which is to make the parameter information of the whole network feedback according to the difference.

2.7 I/O of social organization vs. I/O of deep neural networks

The input of social organization is the data information of all aspects of daily life and work. For example, a company is the information of this industry, and the output is the performance of the company. For example, in the national economy, the input is people's consumption, work income, education, etc., and the output is the statistical results of the national economic data.

In terms of relativity,

$$\|organizationinput \longrightarrow organizationoutput\| \sim \|Netinput \longrightarrow Netoutput\| \tag{3}$$

2.8 Underfitting and Overfitting

People at each node may be incompetent or derelict in their duties; May abuse their power, may form parties for personal gain. The corresponding artificial neural network has underfitting and overfitting. Better architecture should be designed to make the model convergence faster and more robust. People are relatively flexible.

But people are also limited, being small relative to the whole group, just as a node of a deep neural network is small relative to the whole vast network. When the whole group is large enough, the person is small relative to the whole group. By contrast, a node of a deep neural network is small relative to the whole large network.

2.9 Conclusion

According to the above description, in human history, the structure of social organization simulates the neural network, and the results obtained by this structure are more intelligent. The current network communication is very developed, data and information transmission is efficient, so that its intelligence is more usable, more can realize its potential.

Transfering Finely designed component to the social organization structure and **transfering different model to different task** can make social organization more intelligent.

3 Algorithms also for lives

For the convenience of the following reading, deep learning is divided into two parts: neural network and learning algorithm.

3.1 Neural networks are extremely adaptable

Through the deep learning community's experimental results of many prevailing tasks, it is found that neural network can adapt to many tasks, such as object detection, segmentation, translation, speech recognition, reinforcement learning tasks, natural language and so on. These are all different forms of neural network organization, splicing different input and loss functions. These suggest that neural networks are extremely adaptable, almost as adaptable as lives in nature. Not only the neural network itself can change to adapt, but also humans can change its proper shape to help the neural network adapt. However, the value of input data and loss function should not change too quickly. The neural network should be given appropriate range of change to learn and fit, otherwise it will fail to learn.

lives are also highly adaptable. Similarly, lives in the too fast changing environment, will not adapt to the environment and be eliminated; lives in the fixed environment itself changes too fast, will not adapt to the environment and be eliminated.

Neural networks have extremely strong fitting ability, but they just need to learn to fit as the input and loss functions change smoothly (not beyond the boundary of adaptability). Neural networks don't get better or worse, they only fit true functions.

lives, on the other hand, is extremely adaptable and needs to adapt as the environment and feedback changes.

3.2 Learning algorithms vs. Darwin's evolution

Next, we will discuss the learning process of neural network and observe whether it conforms to the description of Darwinian evolution.

The main elements of Darwin's theory of natural selection include: overbreeding, the struggle for survival (also called the competition for survival), heredity and variation, and the survival of the fittest [5].When we look at the neural network algorithm, we can find these traces.

1. Overreproduction: As individuals increase, the network becomes wider, and the lenght after good organization becomes longer. It alse increases diversity.
2. Survival struggle: let's discuss the right of the equation 2. In the process of network training, W_i is constantly changing and sparse (most of them are close to 0), and large W_i is more likely to win from the competition; In the end, the big one in $W_i * X_i$ can win.
3. Unity and cooperation: The right of the equation 2, the sum, represents the unity of all forces, the strength accumulated on the long tail can not be ignored, and is conducive to maintaining diversity.
4. Survival of the fittest: In the selection process, some are eliminated. Of course, ones in some accidents and natural disasters are eliminated. It's just to fit.
5. Genetic variation: This is missing from current neural network algorithms.

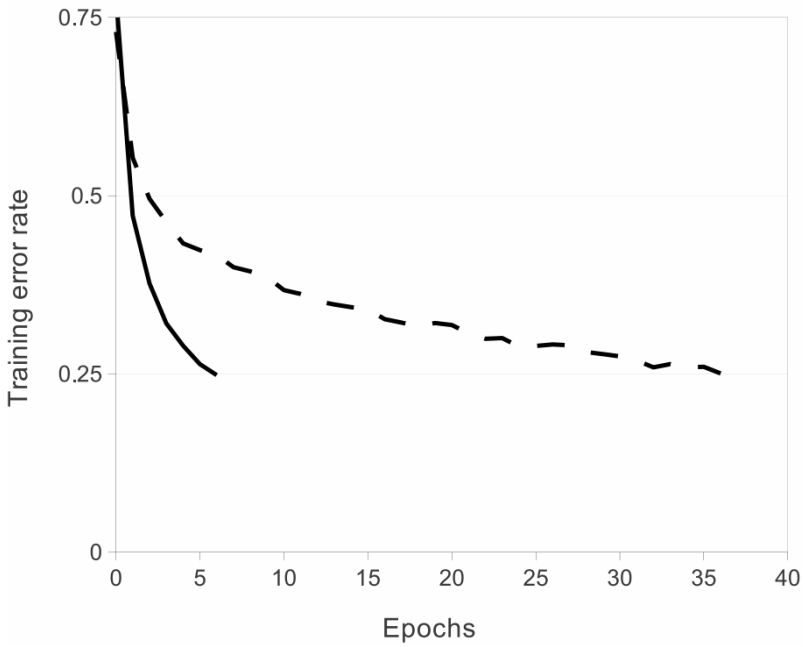

Figure 1: trainloss in learning process shows the downward trend of train error in neural network AlexNet[6] training task.

Ones like the figure (Fig. 1) is very common in neural network training tasks after 2012 [6].

We now have that the neural network with subscripts identifying epoch is A_0, A_5, A_{10}, A_{15}, A_{20}, A_{25}, A_{30}, A_{35}. At the beginning, the neural network does not fit the true function well, and it keeps fitting along learning. By changing the input and loss functions, the neural network will fit to different true functions. And in an environment where the A_5 and the A_{35} exist together, obviously the A_5 is lagging behind. A_{30}, A_{25}, A_{20}, A_{15}, A_{10}, A_5, A_0 Their chances of being eliminated are increasing. We choose A_{30} first when we must choose one.

We also look at it from the point of view of organisms adapting to their environment. The initial neural network is not well adapted to the current environment and feedback, so it can adapt to the environment and feedback through long learning. And change the environment and feedback so that the neural network can learn until it adapts to the environment. Neural networks change the environment while adapting to it. And in an environment where the A_5 and the A_{35} exist together, obviously the A_5 is lagging behind. A_{30}, A_{25}, A_{20}, A_{15}, A_{10}, A_5, A_0 Their chances of being eliminated are increasing. A similar process can be seen in Darwin's On the Origin of Species[5].

This is a more formulaic explanation than evolution[5]. It can explain more about morphological changes and knowledge changes.

Although other machine learning algorithms have similar learning curves, their capabilities are not as adaptable and perform as well as neural networks.

At the same time, it was observed that from the trainloss curve, the general direction of the curve was down, and there were often jitter jumps in the middle.

It can be inferred from the epoch diagram that, at the beginning, the primitive form of biological individual changes for adaptation at the fastest rate, the bottom line of survival is very low, survival is easy, and plasticity is particularly strong. When the epoch is larger, the individual changes slightly and slowly, but the whole still has room to improve and adapt to progress. The training curve illustrates the process of adapting to the environment and feedback in the course of biological evolution. Among them, the speed of morphological change and the jitter problem can be seen from the training curve. Morphological changes are most active at the beginning, and slow in the middle, sometimes shaking and suddenly changing.

Similar learning processes occur from birth, infancy, childhood, and adulthood.

3.3 The whole natural system is a huge neural network

Human society is a neural network with nested brain nerves. Animals also have brain nerves. Plants can transmit dangerous information through a system similar to the nervous system of animals. It can be inferred that the whole natural system composed of people, animals, plants and microorganisms is also a neural network. It can be said that the individual organisms on the earth contain neural networks, and all organisms also form neural networks among themselves. There is a huge neural network on the earth.

Reproductive system and genetic variation are to supplement new individuals due to death to maintain the population quantity and diversity as much as possible. Death is also to avoid the collapse of the whole neural network caused by the rapid increase of a certain population to the point that the whole system can not afford, so as to ensure that the connection of the whole neural network will not be broken, so that the whole neural network will be stable. The cranial nerve and this huge neural network are the same thing, and I see them all together. But whether the human brain is a nested neural network is unknown.

3.4 Neural networks are the algorithms of lives

From the above analysis, it can be seen that individual life, biological groups in nature, their life performance follows the neural network learning algorithm.

3.5 Just to fit

The optimization algorithm is to make the model (including machine learning model, neural network model) fit the objective function, while all the organisms on the earth are to fit some function on the environment, and this function can make the organisms adapt, and the higher the degree of fitting, the more adapted.The Morphology and knowledge of all creatures are just ot fit this function.

So how do organisms adapt?

1. Morphological adaptation, without much discussion here, see Darwin's On the Origin of Species[5]. Personally, I think Morphology is the physical existence form of neural network.

2. Discuss the process of knowledge growth from birth to adulthood. It is found that a child does not know anything at birth and is very plastic. When he was born, he did not know what oxygen and air are because of the lack of oxygen. The environment and the feedback of his body reaction gave him, but he cried instinctively in order to adapt and get breathing. He does not know what milk is, his body's hunger feeds back to him, but he will instinctively learn to drink milk. Later, he gradually learned to understand the world of people, apples, trees, flowers and so on, with eyes, skin, ears, nose, brain centers and other neural networks from the environment and feedback (including the natural environment, feedback from parents and relatives, he explored by himself) to adapt. Another example is what is the economy, people can not use the human senses to detect. But a newborn baby doesn't feel it, children don't feel it as deeply as adults, experts understand it more deeply; These are the different degrees of adaptation of neural networks at different growth stages to the environment and feedback.

3. Discuss the process of human knowledge of the world. From the point of view of human history, at the beginning, human only knew the stone, repeatedly pounding, found that the stone is very hard and can be used as a weapon to attack animals, later domesticated plants, stone can be used to grind rice, later found that some stone is ore, stone can be used to iron, copper and so on, later can use SiO2 to make silicon wafer wafer. The accumulation of feedback in the environment will lead to the accumulation of a lot of understanding. By combining these understandings, the neural network will interact with the environment and get feedback constantly. Historically, this has been a cumulative process of continuous adaptation. Each present and combined with the historical memory of the mind, will think what it is. The whole human understanding of the world is constantly improving. In other words, human knowledge is constantly adapting to its environment. Fortunately, the rules of physics, nature, biology, and so on hardly change, but the understanding of organisms as they adapt is constantly changing.

4. Human knowledge constantly fits the real world. Not only from the perspective of individuals, but also from the perspective of human history, every moment is not fully fitted. It is a process of accumulating knowledge and fitting step by step.

3.6 Prospect

It's possible that the oldest learning algorithms for life were crude, adapting to the environment and feedback to become the learning algorithms of today's neural networks. There may be other, more life-related algorithms out there that need more discussion and research. Life algorithms that are more adaptable than neural networks may also appear in the future.

What kind of adaptive ability does neural network have? The boundary of adaptive ability is still unclear, which needs more discussion and research. My personal guess is that every node needs to adapt, so the overall adaptability is limited by the adaptability of all nodes. It is necessary to avoid the complete extinction of a population in the middle of the network and the collapse of the whole network.

Life's vision, hearing, touch, taste, natural language and so on are designed to adapt to the environment and feedback, and the information they interact with the environment as a whole should speed up learning. Sensory systems that are more attuned to environment and feedback, because sensory systems also take a long time to adapt to environment and feedback, allow neural networks to adapt faster.

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