Knowledge Dissemination Model Based on Graph Neural Network

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Abstract. Explore the application of GCN model to the prediction of knowledge transmission model. Teaching abstract into neural network, neural network model parameters education meaning, the model in the frequency domain space, design different convolution kernels, finally by GCN model of common teaching model, discusses several typical teaching model, the results of quantitative and qualitative analysis and comparison of practical teaching results, the rationality of the application of evaluation and scientific. The essence of different teaching organization modes of teachers is to adjust the graph neural network to predict the teaching effect through the model. Combined with the complexity of education and teaching process, the results of artificial intelligence algorithm are in line with the reality of education within the scope of assumptions, which is conducive to knowledge dissemination. Innovation will be applied to the education of the general consumption model. Without a once and for all teaching method, teachers should fully establish various teaching information platforms, cooperate with teaching and reasonable interaction, scientifically organize classroom teaching, establish learning groups composed of students who have mastered some knowledge, and speed up the efficiency of knowledge dissemination.

Keywords: Basic Knowledge propagation model · Semi supervised learning · GCN model · Graph neural network

1 Introduction

The research on neural network has made a breakthrough and become a hot spot for many scholars. Can its achievements be applied to the field of education. The classroom teaching process and influencing factors are complex. Knowledge dissemination models are designed. Different curriculum teaching models are designed into different graph models. Semi supervised entity classification is carried out to quantitatively predict the classroom mastery and scientifically guide teachers' teaching.

1.1 Figure Research on Neural Structure

In 2013, Bruna et al. Proposed the first spectral method in the field of graph convolution by using Laplace transform to define graph convolution in spectral space based on graph

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theory and convolution theorem [1]. In order to reduce the parameter complexity, the chebnet convolution kernel has only k + 1 learnable parameters. After the Chebyshev polynomial is used to replace the spectral convolution kernel, chebnet does not need to perform the characteristic decomposition of the Laplace matrix [2].

GCN [3] proposes an extensible graph based semi supervised learning method, which is based on an effective convolutional neural network that can directly operate on graphs. The hidden layer learned by the model can encode both the local structure of the graph and the features of the vertices. This paper considers the classification of vertices in semi supervised learning graphs, in which only a small number of vertices have label information. The model selects the convolution network structure based on the local first-order approximation of frequency domain convolution, and its computational complexity is the number of edges. The expression ability of GCN is discussed. It is considered that no matter how the features are arranged, the two-layer GCN can separate the features of different location points in the graph [4].

1.2 Artificial Intelligence Application Education

Educational research methods are gradually keen to use artificial intelligence models from general statistical methods. Scholars use the collected data to statistically analyze the reasons for different grades. Cai-yun Zhang combines the classroom behavior video data with psychological quality to scientifically and objectively understand the current situation of pupils' classroom problem behaviors and explore the relationship with psychological quality [5].

Conclusion: According to the different label data of knowledge mastered by students, adopting different teaching organization modes is essentially different graph structure, whether it has an impact on teaching results, whether it can be quantitatively predicted scientifically in advance, and compare the internal law of teaching effects of different teaching organization modes.

2 Design of Knowledge Dissemination Model

Assuming that both teachers and students are points on the graph neural network, the point label is master or not master, and knowledge is transmitted through interaction, the points of the teaching class constitute the graph neural network.

2.1 Principles of Knowledge Dissemination Model

The nodes on the graph represent students, teachers or lesson admiring platforms. The boundary condition between points is that information exchange occurs between points. Whether the space position and gender of students can form an effective edge should be determined according to the actual situation of the teaching classroom. Students usually form an effective edge with the teacher. If the teacher does not look at the students on the Mu class platform and does not cooperate with the Mu class platform, there will be no edge. If students don't listen to classes or completely learn by themselves, they will not be effective. Education and teaching is to spread knowledge in the graph neural

network, and the result is the calculation and modification of eigenvalues (whether to master knowledge) in the graph neural network.

The knowledge transmission model assumes that the model is similar to the continuous supply of knowledge to the surrounding students. The students continue to absorb the knowledge output from neighbors or distant places. In the final state, the knowledge flows steadily at each edge, and each node reaches the steady-state knowledge mastery level. If the eigenvalue is 1 node, the students will fully master the knowledge. The students will accept the knowledge that the near or far labels are always 1 node, which will affect their own labels. Through semi supervised learning with different graph structures, the model predicts which nodes or how many nodes will change the label, and indirectly predicts the possible teaching effect.

Education has its special laws. In a certain period of time, students change their labels through learning. As more and more students label 1, that is, more and more students master knowledge. The teaching links are properly organized. Through discussion among students, students who have mastered the knowledge explain to students who have not mastered the knowledge, which temporarily forms an effective edge.

2.2 Simplified GCN Model

Among the semi supervised models, the simplified GCN model is more successful [2]. The typical simplified model is an extensible method of semi supervised learning based on graph. The convolution network structure is selected based on the local first-order approximation of frequency domain convolution, and the hidden layer representation of the model is learned. After two GCNs, add softmax output layer. The output vertex value is the probability of node category. Adam optimizer is used for training. The initialization learning rate is 0.01, and the cross entropy loss function is used. Based on the propagation rule chebnet, the first-order approximation of frequency domain graph convolution localized by convolution kernel.

Forward propagation was designed and gradient descent method was used for training. Finally, the cross entropy is used to measure the error. The cycle node is an iterative process. The core two steps are to collect the states of neighbor nodes and calculate the “sum” state. The “and” state and the full connection layer with nonlinear activation are fused together to update the state of the current node. In class, students need to actively listen to the teachers or the students around them to explain their knowledge, and constantly receive the influence of the effective edges around them. The so-called "You become who you spend your time with.”.

3 Application of Neural Network GCN Model in Teaching Model Diagram

Transfer the semi supervised learning model to the knowledge dissemination model, and predict the dynamics of students’ mastery of knowledge by comparing the different organizational situations of teachers’ classroom organization and teaching. Considering the particularity of education, the results of the model show that students’ overall mastery of knowledge, and there is no comparison between the changes of each student’s mastery.

3.1 Comparison of Different Teaching Organization Modes on the Teacher Side

Usually the teaching is given by a single teacher, and there is no sampling result statistics for the teaching effect. When the teacher label is 1, the model is semi-supervised, which is estimated to be 27.7 students in the class. When the teacher tag is 0, the model semi-monitors the running result, and it is estimated that the number of master students in the class is 2.81E + 00. Teachers teaching is the first to master, otherwise the class master degree is very poor.

Conclusion: When the sample student label is 1, no matter how many students learn MOOCs or not, it is an optimistic prediction. Among them, teachers and platform cooperation, students did not learn MOOCs error is the least. When the label of sample students is 0, some students study MOOCs, and some students do not study MOOCs, the prediction result is good. The cooperation between teachers and platforms predicted the best results of students' mastery. The conclusion shows that teachers should not excessively interfere with students' viewing of THE MOOC platform, but should actively cooperate with the MOOCs platform to understand students' learning status, so as to predict a higher result.

3.2 Comparison of Teaching Modes of Different Organizations at the Student End

The teacher assumes the teaching mode of one person. The student side is complicated, so different teaching modes and different sampling numbers are designed for different groups. The sampling objects are group leaders, ordinary group members or students without groups.

Through analysis: when the sample is 0, the finer the grouping is, the higher the predicted result will be. However, the difference in Table 3 is that the final trend is different, especially in the case of a group of 15 people, whether the sampling is the group leader or not is very obvious. When the sampling result is 1, the smaller the grouping, the smaller the error of the prediction result, and the more samples, the smaller the error.

Conclusion: Group teaching has advantages. The finer the group is, no matter what the sampling result is, except the overall prediction effect is good, but it brings some defects, the sampling number is not sensitive, and there is little difference between one sample and two samples. In order to give consideration to the teaching organization, it is best to have a group of 5 people and strengthen the detection of the group leader's grasp of the situation.

The results show that: organized group teaching has a positive impact on teaching prediction, relatively good organization is a group of 5 people, whether the sample is the leader affects the prediction results.

3.3 Comparison of the Interaction Between Teacher and Student in the Optimal Mode

Now suppose that the whole class is divided into groups of five, there are six groups in total. First, it is assumed that both teachers and students are changing. Students assume

that the number of samples is the same and adjust the number of group leaders in the samples.

According to the result, a group of 5 people is the best choice. If there are 5 people who are not divided into groups, they all listen to the teacher's lecture individually, and the result is that the students do not understand it, and the teacher basically explains the lesson by himself with the best effect of 1.71E + 01. Better than all the groupings. If you understand, 1.34E-03 is the best combination between the teacher and the platform, with the least error. However, the result is still not as good as the grouping of 3 people.

The conclusion shows that even when the number of people in the group is 5, some results without grouping are better. No teaching organization can be correct all the time, it should be adjusted according to the actual teaching status of students. If students do not grasp, the teacher a targeted explanation of the best effect. Students understand that there is no best organization model, and different models have their own advantages and disadvantages. According to the situation of different teaching organizations, sampling pays attention to the number of group leaders and members. Teachers teach alone, sampling a group leader is the best. Teachers and platform with sample leader and members as half the best. Teachers can explain independently at any time according to their needs, and teachers can improve their own teaching platform to form effective edges whenever needed. In general, the coordination effect between teachers and the platform is relatively best.

4 Evaluation of Teaching Knowledge Dissemination Model Based on Graph Neural Network

Discuss the interpretability of artificial intelligence model. By applying the theory of graph neural network model to the field of education, the rationality and mutual relationship of the overall design model hypothesis are analyzed quantitatively. Reasonable prediction is beneficial to the use of teaching resources or teaching skills and to explore the law of education.

4.1 The Innovative Significance of the Model

Map neural network is applied to the actual teaching process, the algorithm of artificial intelligence based on data to predict high efficiency, through the knowledge propagation model that the effect of different graph model teaching still have difference, in general teachers establish result ideal information interaction platform, students can become effective organization, which is more important discussion group, team members generally for 5 is advisable. Conclusion: To explore general quantitative education data, education and teaching research used to be qualitative research. Even if the survey data is collected, it is based on specific environmental conditions, so it is difficult to generalize the conclusions. By exploring the quantitative law prediction of education, this paper uses the qualitative conclusion of education to verify its correctness, and quickly finds the law of students' mastery in the process of education and teaching, which is conducive to teachers' adjustment of teaching organization plan.

4.2 There Are Some Defects in the Model

It is also necessary to combine education theory with practice. Still need to education management theory and model analysis, the result of the use of artificial intelligence in the field of education, especially in combination with learners' intrinsic feature extraction, which is not only pay attention to the learning environment factors, also need to students intelligence, attention and learning initiative, such as internal variable considering education, make the quantitative model of education more close to actual.

Conclusion: The reasoning process of the model also needs empirical analysis and standardization. The teaching process is very complex, and it also needs to continue to reasonably predict and classify the teaching results in the empirical process, so as to standardize and improve the analysis methods. Quantitative analysis is tested by qualitative analysis. This model uses graph neural network to predict teaching results. Considering that the data of each class is dynamic and difficult to collect and detect, qualitative analysis is only based on the correctness of the model.

4.3 The Model Still Needs to Be Improved

When discussing the law of education, there are more qualitative theories. Even if there are certain quantitative data, the relevant conclusions are drawn based on the data by collecting sample characteristics. Through the application of artificial intelligence learning and graph neural network in the education industry, quantitative research on the law of education, timely prediction of students to grasp the situation of knowledge, adjust the teaching schedule and organization of teaching mode at any time, focus on improving the teaching effect.

However, the model should be adjusted in combination with practice and explored deeply through theory to approach the essential law of education. The assumptions of the model also need to be combined with various realities, such as reasonable prediction of multi-modal data such as student expressions.

Conclusion: the teaching knowledge dissemination model simulates the teaching practice, and the different organizations in the teaching process are represented by graph neural network. The conclusion is consistent with the results of general qualitative analysis. The teaching process is accompanied by the change of students' mastery of different labels, and the results of graph neural network show dynamic and complex characteristics. Teachers need to collect label data from multiple channels, flexibly organize teaching, change different graph structures, and improve teaching efficiency.

5 Conclusion

Teachers should master all knowledge points in teaching, and the label is always 1. The student sampling label is 1, indicating that the teaching effect is good. If the label is 0, a certain number of students may not understand it. Pay special attention to querying the records of the MOOC class platform and take targeted education. The number of students in the group is generally 5, and the teaching effect is good if the team leader has strong ability. But if you don't master the time, the effect of teaching alone is good.

There is no fixed model for organizing teaching, but when a student is found to be labeled as 1, strengthen the communication between the student and other students to improve class efficiency.

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