Analysis and Research on Educational Aid Approach Based on Data Mining Algorithm

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Abstract
The purpose of this paper is to research on the educational aid approach based on data mining algorithm. First, we should aim at the actual needs of the poor college students. Secondly, we should attach great importance to the training specifications for college students. Therefore, the aid to the poor college students should establish the idea of education and construct and implement the system of "education + assistance" to the poor students. This system should be made up of aid targets, aid content and aid implementation. The experiment shows the data mining method is suitable and effective to the analysis and research on the educational aid approach in China.

Keywords: Treatment, Educational aid, Data mining algorithm

1. Introduction
It is generally believed that the popularization of public education plays an important role in the development of the country as a whole. In the 60 years from the civil war to the first World War, the United States has rapidly become the number one industrial power in the world, of which educational science and technology have played an important role. After the rapid development of Japan after the Second World War, the role of public education is more important. In Japan, the concept of equal educational opportunity has been deeply rooted in the hearts of the people. The educational assistance for poor families is fixed in the form of national law, while strengthening the popularization of compulsory education; all kinds of measures to encourage higher education are adopted at the same time, constantly improving the quality of the citizens.

Before the reform of educational system, China has always regarded education as public welfare undertakings, and basically implemented a policy of free education, such as free tuition in primary education, only collecting a small amount of miscellaneous fees. Undergraduate educations, tuition fees are exempt, graduate education, not only exempt from fees, and is in fact paid to school. This is determined by the highly planned economic system implemented at the time of our country. However, due to China's large population, unbalanced regional economic development and low level of overall economic development, the practice of educational welfare is bound to be restricted in the process of popularizing compulsory education. As of 1988, the rate of secondary school enrolment in China was 37%, and the university enrollment rate was only about 2% of the age of the appropriate age population.

With the development of national system reform and the transformation of planned economy system to market economy system, a lot of drawbacks such as fossilization of education management system, lack of competition and encouragement, examination oriented education and restriction of innovation have been appearing for a long time. The industrialization of education is put forward in this specific context, to change China's current education, especially the public higher education of the situation, learn from the advanced experience of the world and other public and private schools run by social forces, in accordance with the allocation of education resources in the market mechanism, expand the education supply capacity, improve the efficiency of the use of educational resources. At the same time, a substantial increase in the cost of education is unavoidable. Related survey shows that urban residents in 173 households in 54% households children a semester 1208 Yuan per capita expenditure; raise a child from kindergarten to university graduates 20 years a total cost of 55 thousand Yuan, not including the students life; the study during the university fees and living expenses for personal expenses in 9000 Yuan per year about. At present, the minimum standard of living in many cities and towns is on the left of 200~300 Yuan, and it is clear that such a huge educational expenditure makes it difficult for them to afford it.

Under such circumstances, taking into account the efficiency of the education industry, we should pay attention to the educational equity of the relatively poor areas and the poor students. That's the mission of educational assistance. The main contents of China's educational aid system include:

1. salvage object
The object of compulsory education assistance including family urban and rural students; state-owned enterprises poor working families, orphans, children of martyrs; students; families of students with disabilities; social welfare institutions care for students; the poor families of disabled children; there is no source of children of single parent families; children unable to maintain basic living families due to disasters, disease etc.
The object of relief education include: secondary occupation by the city (state) and the education administrative department or the administrative department of labor security, has registered full-time in the school grade one or two secondary occupation school secondary occupation education formal school all rural students and the county (including county-level city, agricultural area) students and family economic difficulties of non-agricultural City.

The object of higher education assistance include: urban subsistence allowances for poor families and no source of income and the ability to pay the first enrollment fee; the per capita income of rural households for the first time enrollment fee below the poverty line and no source of income and the ability to pay the family for children; family lose labor ability, natural calamities and man-made misfortunes, lost the life source of students the families of the children of martyrs; and there is no source of children of poor families of disabled orphans (Mohsen, 2016; Birchler, 2017).

2. Salvage content

For the target of the compulsory education in accordance with the above conditions, the tuition and miscellaneous fees will be reduced and the textbooks for the students with special difficulties are provided free of charge. Students in special education schools have to deduct and exemption from tuition, and provide textbooks free of charge for the living expenses of students living in special hardship families. For the support of rural compulsory education in the rural areas, especially in the poverty-stricken areas of Western China, the State Council proposed that all students' tuition fees in the compulsory education stage in Western China should be relieved from 2006, and expanded to the central and eastern regions in 2007. According to statistics, the national rural primary and secondary schools can abolish 15 billion Yuan per year, and share 180 Yuan and 140 Yuan respectively.

For those who meet the above requirements, the school will subsidize the students who conform to the above conditions according to the actual situation. The subsidy standard is no more than the tuition fee of the planned students, and the living expenses for the students with special difficulties can be appropriately subsidized.

For non-compulsory education is also in universities, higher occupation colleges and secondary occupation school students family economic difficulties relief, at present, has formed the system of subsidy policy for college students with financial difficulties to national scholarships, national motivational scholarships, state grants, student loans, free education, work study, tuition such as the coexistence of various forms of. For example, the national stipend is jointly funded by the central and local governments, which mainly subsidize the student's living expenses. The national standard is 2000 yuan per student per year.

3. Salvage funds

The funds for exemption of tuition and miscellaneous fees are jointly undertaken by the central and local finance. The central and local share ratios are: 8:2 in the western region, 6:4 in the central region, and the proportion of the central and local share in the eastern part of the province, according to the local financial resources, except the municipalities directly under the central government. In the eastern region, the provinces which have not enjoyed the central subsidy are fully funded by the local finance. Free textbooks for poor students will be provided. The central and western regions will be fully borne by the central government, and the eastern areas will be borne by the local governments. The allowance for living expenses for the poor boarding students will be borne by the local government.

2. Data mining model and algorithm

Data mining generally refers to the process of searching the information from a large number of data through algorithm search. Data mining is usually related to computer science, and achieves the above goals through statistics, online analysis, information retrieval, machine learning, expert system (relying on past experience rule), pattern recognition and many other methods.

Need is the mother of invention. In recent years, data mining has aroused great concern in the information industry. The main reason is that there is a lot of data and can be widely used, and it is urgent to transform these data into useful information and knowledge. The information and knowledge obtained can be widely used in various applications, including business management, production control, market analysis, engineering design and scientific exploration.

Data mining has used some ideas from the following areas: (1) sampling, estimation and hypothesis testing from statistics, (2) artificial intelligence, pattern recognition and machine learning search algorithm, modeling technology and learning theory. Data mining has also rapidly accepted ideas from other fields, including optimization, evolutionary computation, information theory, signal processing, visualization and information retrieval. Some other areas also play an important supporting role. In particular, the database system is required to provide effective storage, index, and query processing support. Technology derived from high performance (parallel) computing is often important in dealing with mass data sets. Distributed technology can also help deal
with massive data, and it is more important when data can't be concentrated together (Riddell, 2016; Elsevier, 2016).

Data association is an important class of knowledge that can be found in the database. If there is a certain regularity between the values of two or more variables, it is called Association. Association can be divided into simple correlation, time series Association and causal association. The purpose of association analysis is to find out the hidden association network in the database. Sometimes the association function of the data in a database is not known, even if it is uncertain, so the rules generated by the association analysis are credible. Association rule mining finds interesting association or correlation relationships among a large set of data items. Agrawal in 1993 first proposed the problem of mining association rules from customer transactional databases, has done a lot of research after many researchers on the issue of mining association rules. Their work includes optimizing the existing algorithm, such as introducing random sampling and parallel thinking, so as to improve the efficiency of algorithm mining rules, and extend the application of association rules. Association rules mining is an important topic in data mining, and has been widely studied by the industry in recent years.

There are two stages in the process of association rule mining. First, we must find out all the high frequency project groups (Frequent Item sets) from the data set, and then generate association rules (Association Rules) in the second stage. Data mining topology is shown in figure 1 and the data mining model is shown in the figure 2.

![Figure 1. The topology](image1.png)

![Figure 2. The data mining model](image2.png)
The first phase of association rules mining must be from the original set of data to find out all the high frequency project groups (Large Item sets). High frequency means that the frequency of a project group appears to be at a certain level compared to all records. A group project called frequency support (Support), consisting of a A and B two 2-itemset project as an example, we can through the formula (1) obtained by including {A, support the B} project, if the support is greater than or equal to the minimum support threshold (Minimum Support) when [A B], known as the high frequency group project. A k-item set that satisfies the minimum support degree is called the high frequency k-project group (Frequent k-item set), which is generally represented as Large K or Frequent K. The algorithm also generates Large k+1 from the project group of Large K until a longer high frequency project group cannot be found.

The second stage of association rule mining is to produce association rules (Association Rules). The association rules generated from the high-frequency project group are generated by the previous high-frequency k-project group. Under the threshold condition of the minimum Minimum (Confidence), if the trust degree obtained by a rule satisfies the minimum confidence level, it is called the association rule. For example, the rule AB generated by {A and B} in high-frequency k-project can be obtained by formula (1). If trust degree is greater than or equal to the minimum confidence level, AB is called association rule (Sumida, 2017; Birchler, 2015).

\[
\dot{z}_1 = x_1 - \dot{y}_d = x_2 - \dot{y}_d = z_2 + \alpha t - \dot{y}_d
\]

The first derivative of the Lyapunov function can be written as

\[
\dot{V}_1 = z_1 T z_1 = z_1^T (x_1 - \dot{y}_d) = z_1^T (x_2 - \dot{y}_d)
\]

\[
= z_1^T (z_2 + \dot{y}_d) = -\lambda z_1^T z_1 + \alpha z_2^T z_2
\]

From (2) and (6), it can be obtained:

\[
\dot{z}_2 = \dot{x}_2 - \dot{a}_t = -M^{-1} C x_2 - M^{-1} (G_\ell + d) + M^{-1} \tau - \dot{a}_t
\]

\[
\tau = -\dot{z}_2 - z_t - F
\]

Then we can get:

\[
V_2 = V_1 + \frac{1}{2} z_1^T M z_1
\]

\[
V_2 = V_1 + \frac{1}{2} z_2^T M z_2 + \frac{1}{2} z_2^T M z_2 + \frac{1}{2} z_2^T M z_2
\]

\[
= -\lambda z_1^T z_1 + \alpha z_2^T z_2 + z_2^T M (\dot{x}_2 - \dot{a}_t) + z_2^T C z_2
\]

\[
= -\lambda z_1^T z_1 + \alpha z_2^T z_2 + z_2^T (-C x_2 + C z_2 + \tau
\]

\[
\tau = -M \dot{a}_t - (G_\ell + d)
\]

\[
= -\lambda z_1^T z_1 + \alpha z_2^T z_2 + z_2^T (-F - \tau) - z_2^T (G_\ell + d)
\]

\[
\dot{V}_2 = -\lambda z_1^T z_1 + \alpha z_2^T z_2 + z_2^T (-F - \tau) - z_2^T (G_\ell + d)
\]

The ideal weight W from (3) and expressed as

\[
F = W^T \Phi(\mu)
\]

And local fractional integral of \( f(x) \) defined by Eq.9.

\[
_{\alpha} I^\alpha_k f(t) = \frac{1}{\Gamma(1 + \alpha)} \int_a^t f(t)(dt)^\alpha = \frac{1}{\Gamma(1 + \alpha)} \lim_{\Delta \to 0} \sum_{j=0}^{j=N-1} f(t_j)(\Delta t_j)^\alpha
\]

Its local fractional Hilbert transform, denoted by \( f_x^{H,\alpha}(x) \) is defined by

\[
H_\alpha \{ f(t) \} = \hat{f}_n^{H,\alpha}(x) = \frac{1}{\Gamma(1 + \alpha)} \int_x^\alpha f(t)(t - x)^\alpha (dt)^\alpha
\]

Where x is real and the integral is treated as a Cauchy principal value, that is,

\[
\frac{1}{\Gamma(1 + \alpha)} \int_x^\alpha f(t)(t - x)^\alpha (dt)^\alpha = \lim_{\varepsilon \to 0} \frac{1}{\Gamma(1 + \alpha)} \int_{x-\varepsilon}^{x\varepsilon} f(t)(t - x)^\alpha (dt)^\alpha + \frac{1}{\Gamma(1 + \alpha)} \int_{x+\varepsilon}^{x\varepsilon} f(t)(t - x)^\alpha (dt)^\alpha
\]

According to the different circumstances, the association rules can be classified as follows:
1. The association rules can be divided into Boolean and numeric types based on the categories of variables that are processed in the rule.
The value of the Boolean association rules are all types of discretization, it shows the relationship between these variables; and quantitative association rules and multidimensional association or multilevel association rules combined with the processing of numerical field, the dynamic segmentation, or directly on the original data processing of course, quantitative association rules can contain type variables.

2. Based on the abstract level of the data in the rule, it can be divided into single layer association rules and multi-layer association rules.

In the single level association rules, all variables do not take into account that the real data is of many different levels, but in the multilevel association rules, the multilevel of data has been fully considered. For example, IBM desktop => Sony printer is a single layer association rule on detail data. Desktop => Sony printer is a multi-level association rule between high level and detail level.

3. Based on the dimension of the data involved in the rule, the association rules can be divided into single dimension and multidimensional.

In single dimensional association rules, we only relate to one dimension of data, such as goods purchased by users, while in multidimensional association rules, the data to be processed will involve multiple dimensions. In another word, a single dimension association rule is a relationship in dealing with a single attribute; a multidimensional association rule is a certain relationship between the processing of various attributes. For example: Beer = diaper, the rule refers only to the user's purchase of the goods; gender = "female" = = "occupation Secretary", this rule involves two fields of information, is an association rule on the two dimension.

3. Approaches of education aid for poor university students

The diversification of education aid for poor university students determined that the aid should also be implemented through multiple approaches. It needs to notice that all aid approaches are a complex system containing rich contents, and a strong correlation is existed among all factors in the system. Therefore, we consider that the education aid approach for poor university students is constituted by two parts: the specific individual subsystems in the whole system, and the organic combination among each subsystem.

3.1. Approaches of economic aid

“Award” refers to scholarship. It is the scholarship especially set for poor university students by the country, people's governments at all levels, enterprises, all kinds of charity organizations and other sectors of the society. “Loan” refers to student loan. Student loan is the unsecured credit implemented by our government for the strategy of rejuvenating the country through science and education, accelerating the talent training and subsidizing poor students. “Diligence” refers to work-study program. Namely, university students get paid legally through providing physical and mental labor services. “Grant” means the student grant specially set for poor university students by central peoples government, people’s governments at all levels, enterprises, all kinds of charity organizations, and other sectors of the society. “Allowance” refers to the special financial difficulties allowance provided by the country or the school. The special financial difficulties allowance is the important aid mode for solving students’ basic life problem and temporary poverty. “Exemption” refers to reduce or waive tuition fees, and it is the important key aid approach provided by universities for the disabled students, orphans, poor ethnic minority students, martyr children and children come from other families where are given preferential treatment, compensation and comfort. In addition, “Green Channel” system is also the effective economic aid approach for poor university students. However, “Green Channel” shows as the characteristic of process more, but the final aid can also be implemented through the above approaches.

3.2. Approaches for ideological education aid

(1) Classroom education.

Classroom education is the main channel and battle position for systematically educating young university students on both ideological and political, especially for “two classes” teaching, it is the main approach to effectively, systematically and normatively conduct the party’s route, scheme, and political publicity, and to systematically educate university students’ world view, view of life, and values. It acts the important role for cultivating young university students to become the builders and successors of the socialist cause. However, its main characteristic is the education aiming at all university students. Therefore, its role (namely influence) on education of poor university students will not be discussed profoundly.

(2) Campus culture.

Campus culture plays a crucial role in poor university students. Caring for weak groups should be the common value direction of campus culture. We should make poor students gain the equal status with others when enjoying the aid, make them enjoy the same campus culture participation right with other university students, and make their stories of overcoming difficulties and succeeding in study confirmed fully by the campus culture. The standard for measuring whether this aid approach is effectively established and testing its effect should be that most or poor students which can confront with their poverty positively and be developed.
comprehensively and actively under the caring of students and teachers. All universities can create the good public opinion environment for poor students, provide them with rich and colorful campus culture activities, establish the student clubs with aid function for poor students or social weak groups, and construct the talent show platform for them.

We need to pay particular attention to emphasize commending and motivation on excellent individuals and groups in poor university students in the incentive system.

(3) Social practice.

Social practice is the effective approach to conduct the ideological and political education on university students, and it is also the important channel to conduct the ideological and political education on poor students. On the one hand, we should create opportunities for poor university students to widely participate in the social practice activities, and make them gain both knowledge and ability. On the other hand, we should attach importance to their recognition on the national situation and their establishment on social responsibility. Therefore, we are inclined to organize poor university students to conduct the social practice activities in "old, minority, border or impoverished" regions, and make them envisage and correctly understand their own difficulties based on comprehensively recognizing the national situation. Making their sense of responsibility on serving the motherland enhanced in the process of contributing to the society and showing self-worth; making them feel the warmth of society and making their enthusiasm on passing the love enhanced in comparison to the weak groups who demand the aid more.

(4) Individual education.

Every poor university student has different experience and faces with different ideological problem, and therefore, it are hard to solve their specific ideological problem only through the one-sided education. Therefore, the education about sex should also be conducted aiming at the specific ideological problem of different individuals when providing the one-sided education for poor university students. We can open poor student education homepage and related sites making full utilization of campus network, set chat room, consulting hotline, and make positive online communication for poor university students. Meanwhile, we suggest instructors and poor university students to regularly exchange ideas, thus to solve the problems encountered by them in growth.

3.3. Approaches for academic aid

Establish special supervision mechanism. We consider that it is very necessary to conduct the special education on poor university students based on general education. The adaptability education and supervision teaching of senior students on lower grade students should be implemented widely. On this basis, the outstanding senior students are assigned to, or political advisors or specialist teacher who voluntarily participate in this work directly involve in the key enhancement on poor university students’ study supervision, making them transit to university from high school successfully, thus to adapt to the university study. Intensify training and form the specialty. Although China’s higher education enters into popularized stage recognized internationally, the number of university students is still minority in school-age youth, thus they are outstanding in the youth at the same age. There is always a phenomenon when those strong performers in youth group come from different areas, and namely, “mediocrity of university students”. In order to overcome the problem of “mediocrity of university students”, the following countermeasures are taken: first, the incentive directed system is established from the perspective of student education management, encouraging students from multiple directions and approaches; second, emphatically absorb poor university students to participate through holding all kinds of extra-curricular training class or organizing all kinds of associations. Help poor university students form their specialty, and promote the organic combination between their individuation and self-identity. Establish “one helps one” in study. The problems of poor cultural base and comprehensive quality, difficulty in professional study are existed in poor university students, so the help aiming at individual poor student should be enhanced when educating poor students. Motivate and organize full-time teachers to participate in the academic counseling on poor university students. For teachers, it is dedication of love, and meanwhile, it can also objectivize the work of teaching and educating, and “teach students in accordance of their aptitude” based on understanding students. Improve the teaching quality. For poor university students, more learning guidance in comparison to other students can play a positive role in improving their study interests and study performance.

3.4. Approach of mental health aid

Envisage poverty, and improve ability. Through investigation, we found that poor university students present the differentiation status, and there is the direct causal association with whether poor university students envisage their economic status and the fact of poverty. Therefore, conducting family economic difficulty self-narration in the group of poor university students through group counseling or organizing special activities is a method which can alleviate the students’ psychological pressure. Secondly, this method can overcome their self-suffering consciousness and promote their rational cognition on poverty. Thirdly, this method can make them
dare to face the fact of poverty. Frankly accept the publicity of aid situation. Weaken the hurt brought for them in the construction process of institutional science. Enhance emotional cultivation and make up for the lack of family affection. Creating the family environment is the important mode and approach to effectively improve poor university students’ flattening of affect and cultivate their healthy psychology. In the actual work, we provide an aid program of family docking aid for poor university students. The aiding family establishes the sibling relationship with the aided family when aiding poor students economically, and makes poor students participate in the family life of aiding family regularly. Practice has proved that poor university students’ EQ has been improved obviously after integrating into the aiding family. The enhancement of EQ has the obvious improvement effect for poor university students’ mentality changing, confidence increasing and others. Therefore, enhancing the emotional education should also be the important channel for poor university students’ psychological aid.

4. Conclusion

Aid for poor college students is to provide all kinds of necessary help and support to the special group of poor college students. The aid to the poor college students should first be aimed at the actual needs of the poor students. Secondly, we should attach great importance to the training specifications of colleges and universities. The concept of education should be established and the system of "education + assistance" for poor students should be constructed and implemented.

The educational assistance for poor college students refers to the aid system with education as the core and the purpose of promoting poor college students to become all-round socialist builders and successors. The author believes that this system should be made up of aid targets, aid content and aid implementation. In this paper, the author researched on the educational aid approach based on data mining algorithm. First, we should aim at the actual needs of the poor college students. Secondly, we should attach great importance to the training specifications for college students. The special financial difficulties allowance is the important aid mode for solving students’ basic life problem and temporary poverty. “Exemption” refers to reduce or waive tuition fees, and it is the important key aid approach provided by universities for the disabled students, orphans, poor ethnic minority students, martyr children and children come from other families where are given preferential treatment, compensation and comfort. Although China’s higher education enters into popularized stage recognized internationally, the number of university students is still minority in school-age youth, thus they are outstanding in the youth at the same age. There is always a phenomenon when those strong performers in youth group come from different areas, and namely, “mediocrity of university students”. In order to overcome the problem of “mediocrity of university students”, the following countermeasures are taken: first, the incentive directed system is established from the perspective of student education management, encouraging students from multiple directions and approaches; second, emphatically absorb poor university students to participate through holding all kinds of extra-curricular training class or organizing all kinds of associations. The experiment shows the data mining method is suitable and effective to the analysis and research on the educational aid approach in China.

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