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Analysis and Prediction of “AI + Education” Attention Based on Baidu Index—Taking Guizhou Province as an Example

Yulin Zhao, Junke Li * and Jiang-E Wang

College of Computer and Information, Qiannan Normal University for Nationalities, Duyun 558000, China; zhaoyulin@sgmtu.edu.cn (Y.Z.); wangjiange@sgmtu.edu.cn (J.W.)

* Correspondence: junker_li@sgmtu.edu.cn; Tel.: +86-185-8515-1602

Abstract: Studying the attention of “artificial intelligence + education” in ethnic areas is of great significance for China for promoting the integrated development of new educational modes and modern technology in the western region. Guizhou province is an area inhabited by ethnic minorities, located in the heart of Southwest China. The development of its intelligent education has strong enlightenment for the whole country and the region. Therefore, this paper selects the Baidu Index of “artificial intelligence (AI) + education” in Guizhou province from 2013 to 2020, analyzes the spatial–temporal characteristics of its network attention by using the elastic coefficient method, and builds the ARIMA model on this basis to predict future development. The results show that the public’s attention to “AI + education” differs significantly in time and space. Then, according to the prediction results, this paper puts forward relevant suggestions for the country to promote the sustainable development of education in western ethnic areas.

Keywords: artificial intelligence and education; Baidu Index; network attention; ARIMA model; prediction



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1. Introduction

As the main driving force of the next scientific and industrial revolution, artificial intelligence is having a profound impact on the global economy, the world’s military, and human life. The development of artificial intelligence technology has promoted social progress, and its application has penetrated all walks of life. The development of technology needs high-tech talents, and the cultivation of talent depends on education. At present, image recognition, human–computer interaction, and other artificial intelligence application technologies have been applied in the field of education. Artificial intelligence (AI) and education big data can improve teaching efficiency, reduce repetitive lesson preparation work, and help students with personalized learning, conducive to the cultivation of new talents. “AI +” has become a new trend of future development and has attracted strong attention from all countries of the world. China is no exception. According to a report (“AI: The Creation, Transfer, and Application of Knowledge”) released by Dutch research firm Elsevier, China is becoming increasingly important in the field of artificial intelligence and is likely to lead the AI wave on a global scale. China’s development has benefited from policy support, data resources, and talent advantages. China’s economic and technological development is conducive to promoting global technological progress and technological efficiency, deepening the global division of labor, improving the efficiency of global resource allocation and providing a reference for the development of other countries of the world.

With the development of information technology, artificial intelligence is gradually improving people’s lives. The construction of an intelligent education ecological system is helpful to promote the application of modern technology in education. In recent years, to implement the nineteen spirits of the party and actively promote the development of “Internet and education”, China has implemented a series of activities, such as popularizing digital resource services and digital campus construction, covering online learning spaces,

and optimizing education governance capacity. We should comprehensively improve information literacy, promote the accurate support of intelligence under network conditions, carry out the construction of the intelligent campus, promote the application of artificial intelligence in the whole process of teaching, management, and resource construction, and gradually form the intelligent interaction mode of artificial intelligence + X [1]. With the continuous promotion of big data, the combination of artificial intelligence and the education industry has become an inevitable trend of future education development. With science and technology changing education and making learning more efficient, AI education can cultivate students to pay more attention to the analysis and reasoning process of problem cognition and provide new ideas for the realization of quality education. The development of the integration of artificial intelligence and education is imperative. Therefore, research on the attention to and trend of the keyword “artificial intelligence + education” can provide a reference for the country to take more effective measures to promote the development of the integration of education and science and technology.

Guizhou is a typical representative of the minority areas in western China, and the development of its new educational model has strong enlightenment for the minority areas in China. The particularity of Guizhou is mainly reflected in the following aspects: (1) Guizhou has advantageous resources suitable for the growth of the big data industry. In 2015, the first national bureau data center was set up in Guizhou. Guizhou, as the main battleground of “power transmission from west to east”, is a “Chinese computer room” paradise, providing favorable conditions for the growth of data resources with a stable and reliable power supply, water, and fire mutual aid. Many first-tier Internet companies, such as Tencent, Alibaba, and Apple, have set up distributed computer rooms and cloud computing centers in Guizhou province. (2) Guizhou has provided strong policy support for the development of a new generation of artificial intelligence. It mainly includes providing financial services and capital guarantees for the development of an artificial intelligence industry, support for artificial intelligence industry innovation and application demonstration and, to the artificial intelligence industry, a main body of support for talent guarantees and artificial intelligence industry technology innovation. (3) Guizhou is a typical representative of China’s minority areas. According to the sixth census, there are 54 ethnic groups in Guizhou province. Guizhou is the representative of western China and the epitome of China’s ethnic regions. The development of AI-assisted teaching in Guizhou, China can serve as a reference for other western ethnic minority areas in China.

At present, many scholars all over the world have done related studies on the development of artificial intelligence and education. For example, presented in [2–7] are application analyses of artificial intelligence in hot fields such as medicine, training, and social interaction. The application of artificial intelligence in future teaching, cloud environment, and STEM is described in [8–14]. In [15–18], the development mode, influencing factors, and challenges of artificial intelligence education are discussed. In [19–22], the application of artificial intelligence in talent training is shown. Based on this, this paper analyzes and predicts the network attention of “artificial intelligence + education” in ethnic areas of Guizhou, China and explores the public’s understanding of the practice and development of education reform in the era of artificial intelligence. Combined with the prediction results, we also provide references and suggestions for the country to promote the information and intelligent development of regional education.

2. Related Research

AI is a leading strategic technology for the future. Countries around the world have fully recognized its criticality and attached great importance to the development of AI. For its development and application in various industries, countries all over the world have related studies.

In Europe and North America, for example, some scholars have analyzed the application of artificial intelligence in real life. Laurent Letourneau-Guillon et al. [2] studied the application of artificial intelligence in medical workflow, process optimization, and

predictive analysis. Rowe Jonathan P et al. [3] found that AI-driven adaptability created good opportunities for adolescent preventive health care. Roy Saunderson et al. [4] proposed that AI training data could help to improve training types and provide appropriate ways for employees to choose. Some scholars analyzed and studied the hot spots and trends of the industry based on network keywords. James Pustejovsky et al. [5] used lexical semantic technology to study corpus. Daria Maltseva et al. [6] used keywords to analyze and study the themes of social networks. Valentina Franzoni et al. [7] conducted a comparative study on the semantics of clustering algorithms based on the similarity evaluation of the Web. Of course, the application of artificial intelligence in education and teaching has also been studied by some scholars. André Renz et al. [8] analyzed the mystique of artificial intelligence in education. Schiff Daniel [9] analyzed the development path of artificial intelligence and education in the future and put forward corresponding strategies. Todd W. Neller [10] proposed the importance of artificial intelligence education based on its auxiliary role in games. María-Blanca Ibáñez et al. [11] explored the role of augmented reality technology in STEM learning.

In Asia, many scholars have also done related research. L. Girish et al. [12] studied the use of artificial intelligence in cloud environments. Nitin Vamsi Dantu et al. [13] studied the application of artificial intelligence in plant disease detection and proposed that artificial intelligence could help increase crop yields. Joshi Shubham et al. [14] analyzed the application of industrial intelligence in teaching programs and proposed that AI could help improve the fairness of education. Artificial intelligence has become the focus of attention of the country, research institutions, enterprises, and universities and is an important strategy to promote the development of science and technology and the overall improvement of productivity.

In China, at the present stage, many scholars have carried out research on relevant aspects. Zhang et al. [15] analyzed the current situation of artificial intelligence education in primary and secondary schools in China and abroad and believed that it is of great significance to integrate artificial intelligence into the curriculums of primary and secondary schools for improving students' information literacy. Ma et al. [16] studied the factors leading to the rise of the new generation of artificial intelligence, as well as the development prospects of artificial intelligence in China's education field, and put forward nine suggestions for accelerating the integration development of education and artificial intelligence based on the opportunities and challenges it faces. Li et al. [17] studied the value implication and limit of teaching freedom under the background of artificial intelligence and proposed that teaching under the background of artificial intelligence should follow the basic law of teaching, construct a rational fence of teaching freedom, conform to the growth law of students, and shape the core pillar of teaching freedom. Cheng et al. [18] believe that under the background of "artificial intelligence + education", the essence of teachers' role positioning lies in strengthening "learning" and "guidance". Teachers must master specific knowledge of artificial intelligence, have the ability to implement education by using artificial intelligence, have the skills to use artificial intelligence for teaching, and be the ones to reflect on the practice of artificial intelligence education. At present, most of the research focuses on (1) the factors, current situation, opportunities, and challenges that promote the development of artificial intelligence education, and (2) in the context of artificial intelligence, the development prospects, application fields of future education, and the positioning of new roles of the teachers and students. Few scholars have analyzed the characteristics of network attention in the time series of "artificial intelligence + education". For the analysis of Internet attention, many scholars use the Baidu Index. Kang et al. [23] predicted the tourism trends of Shanghai based on the data of the Baidu Index. It was concluded that there was a long-term positive correlation between the number of Chinese tourists and its related Baidu Index. Peng et al. [24] studied the importance of vocational education according to the Baidu Index and found that their social attention in spaces, groups, and regions was unbalanced. Then, they put forward that the propaganda and guidance of vocational education should be strengthened.

At present, there are a lot of studies on “AI +” around the world, but there are few pieces of research based on the data demonstration of “AI + education” and the attention of the time series. Based on the Baidu Index, this paper collects relevant data to analyze and demonstrate the current and future development trend of “artificial intelligence + education” and provides data support for previous research by scholars.

3. Methods and Data Sources

3.1. Research Method

The Baidu Index records and analyzes the behavior data of netizens through the Baidu platform to reflect the search scale of a certain word. It can also be used to study the overall trend of a certain word and an industry. “Network attention”, as a measure of social visibility and public influence, reflects the distribution difference of netizens’ attention to an event in time and space and the degree of interest.

First, by introducing the elasticity coefficient, the characteristics of network attention, such as time difference and region difference, are analyzed. Secondly, on this basis, based on the monthly mean value of the “AI + education” Baidu Index of Guizhou province and its cities (prefectures) from 2013 to 2020, the ARIMA model is established to predict the development trend of intelligent education in the next 3–5 years, and relevant suggestions are put forward based on the prediction results.

3.1.1. Coefficient of Elasticity

The elasticity coefficient refers to the ratio of the growth rate of two interrelated economic indicators within a specific time range, which can be used to judge the growing relationship between two economic variables. Generally speaking, there is a certain relationship between network attention and the number of Internet users in the current period. By introducing the elastic coefficient, we can measure the change of the public’s attention to the “artificial intelligence + education” related fields. The formula for calculation is as follows:

$$K = \frac{\Delta T/T}{\Delta Y/Y} \quad (1)$$

where K represents the elasticity coefficient, T represents the Baidu Index value of the combination keyword of “artificial intelligence + education” in the current period, ΔT represents the growth amount of the Baidu Index, Y represents the number of Internet users in the current period, and ΔY represents the growth amount. When $K > 1$, it indicates that the growth rate of the netizens’ attention to the related fields of “artificial intelligence + education” is greater than the growth rate of the number of netizens, and so on.

3.1.2. ARIMA Model

The ARIMA model was built by Python to predict and analyze the development trend of “AI + education” in Guizhou province and its cities (prefectures) in the future.

The ARIMA model is one of the methods of time series prediction analysis. Many examples in the literature show that the ARIMA model has been widely used in the fields of economics, medicine, agriculture, and so on [25,26]. It is usually represented by $ARIMA(p, d, q)$, where AR represents the autoregressive process, MA represents the moving average process, p represents the number of autoregressive terms, d represents the number of different times, and q represents the number of moving average times [27]. The expression of the $ARIMA(p, d, q)$ model is as follows:

$$\left[1 - \sum_{i=1}^p \phi_i L^i \right] (1 - L)^d X_t = \left[1 + \sum_{i=1}^q \theta_i L^i \right] \varepsilon_t \quad (2)$$

where L is the hysteresis operator.

After the establishment of the model, it is necessary to verify the goodness of fit of the model. Generally, the indexes used are Akaike information criterion (AIC) and

root-mean-square error (*RMSE*). The smaller the indexes of the selected model parameters, the higher the goodness of fit of the model [28]. The calculation methods of the *AIC* and *RMSE* are as follows:

$$AIC = -2 \ln(L) + 2k \quad (3)$$

$$RMSE = \sqrt{\frac{1}{m} \sum_{i=1}^m (y_{predict(i)} - y_{(i)})^2} \quad (4)$$

where L is the maximum likelihood function under this model, k is the number of model parameters, m is the number of predicted times, $y_{predict(i)}$ is the predicted value, and $y_{(i)}$ is the true value.

The modeling process of *ARIMA* is to determine the optimal model through the process of model identification and inspection after the original sequence is stabilized. The specific steps are as follows:

1. Stabilization processing: The unit root test method is used to judge the stationarity of the selected data. If it is not stationary, it is necessary to carry out differential processing on the original data to make it stationary (i.e., to determine the difference number d);
2. Model recognition and order determination: Both the autoregressive order p and the moving average order q were tried to take values of 1–3 for parameter estimation, and the correlation coefficient of the model was preliminarily determined by the Akaike information criterion method. Generally, the smaller the *AIC* value, the higher the fitting degree, so the model with the smallest *AIC* was selected first;
3. Model testing: Use the *RMSE* to calculate the error value or to compare the predicted data with the original data over a while to evaluate the effect of model fitting and determine the optimal model parameters;
4. Forecasting: Use the determined optimal model to forecast and analyze the future time.

3.2. Data Source

Based on the official website of Baidu, this paper collects the Baidu Index of the combination keywords of “artificial intelligence + education” for pre-analysis. The period was from 1 January 2013 to 31 October 2020, and the space scope was Guizhou province for its 6 prefecture-level cities and 3 autonomous prefectures. The number of Internet users in the current period came from the Annual Report on Internet Development in Guizhou Province released by the Communications Administration of Guizhou Province [29,30]. The national economic data and student data of each city (prefecture) came from the Annual Statistical Yearbook released by the Bureau of Statistics of Guizhou Province [31], and the data of the national financial education funds came from the Statistical Yearbook released by the National Bureau of Statistics [32].

4. Empirical Analysis

4.1. Analysis of Network Attention of “Artificial Intelligence + Education”

4.1.1. Annual Difference Analysis

In recent years, how to think about and innovate education in the era of artificial intelligence has become the direction and topic of continuous exploration under the new education model. With the development of information technology, the public’s attention to the intelligent education mode on the Internet also shows an obvious upward trend. Figure 1 is the annual average value of the Baidu search index with “AI + education” as the keywords, reflecting the evolution trend of the public’s online attention to the integrated development of AI and education in Guizhou province and 31 provinces (autonomous regions and municipalities) in China from 2013 to 2020.

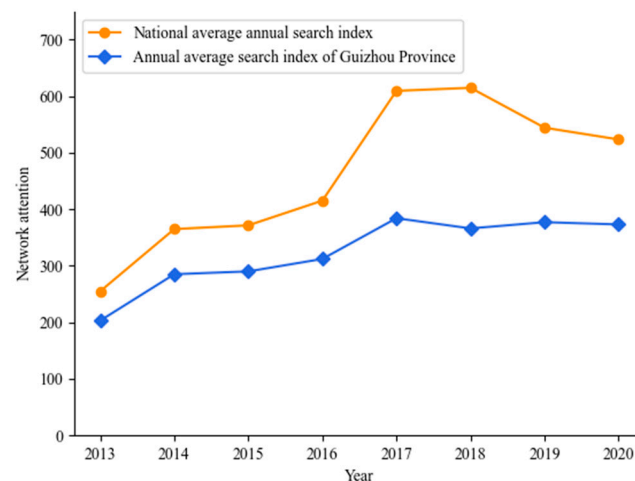


Figure 1. Evolution trend of network attention of “AI + education” from 2013 to 2020.

Figure 1 shows three important pieces of information:

1. From 2013 to 2017, the public’s online attention to the development of intelligent education was on the rise, indicating that the integration of artificial intelligence and education in China was in a period of rapid development. Especially from 2016 to 2017, the search index curve of the whole country and Guizhou province was relatively steep, with an increase of 46.8% and 23.1%, respectively. The main reason for this phenomenon was that “artificial intelligence” was written into the 13th Five-Year Plan in 2016, and the concept of artificial intelligence was included in the major projects of the 13th Five-Year Plan. The National Development and Reform Commission stressed the need to build an “Internet +” innovation network to promote the integration of information technology with various fields and industries, promoting the development of artificial intelligence technology. More people are paying attention to the contents of the 13th Five-Year Plan. The promulgate of the policies of the 13th Five-Year Plan has increased the public’s attention to the development of cutting-edge artificial intelligence technology.
2. From 2017 to 2020, the public’s network attention to the development of intelligent education remained stable, which to some extent reflects that the integrated development of artificial intelligence and education in all regions of China has entered a stable period. During the 13th Five-Year Plan period of Guizhou province, the “artificial intelligence and education” network has attracted more attention because Guizhou province proposed the following in the 13th Five-Year Plan for education development: building a Guizhou intelligent education cloud platform by 2020 to achieve the goal of broadband networks for schools, high-quality resources for all classes, and network learning spaces for everyone [33]. The “Big Data +” education project has been gradually promoted in the province’s education field, pushing Guizhou’s education development onto the track of intellectualization;
3. Compared with the national average search index value, there was still a partial gap in Guizhou. The urban development in the eastern and western regions of China was not synchronous and unbalanced, while the development in the western region was a little slow due to geographical structure, natural conditions, and traffic. According to GDP statistics in the first quarter of 2020, Guizhou ranked 20th, higher than the previous ranking but still lagging behind the national average. Economic development, to a certain extent, determines the speed and scale of the development of science, technology, and education, and then it affects the public’s attention to relevant fields.

Based on this, the elasticity coefficient was introduced to analyze the annual difference of public attention in Guizhou province. Figure 2 reflects the elasticity coefficient of the

online attention of “AI + Education” in Guizhou province from 2014 to 2019. In general, the elasticity coefficient of the attention of “AI + education” showed an obvious trend of fluctuation; the elasticity coefficient was greater than one in 2014 and 2017, indicating that the public’s interest in “AI + education” increased rapidly in these two years. The relatively high elasticity coefficient appeared in 2014, which was largely related to the growth rate of Internet users in Guizhou province during the same period. According to statistics, the growth rate of Internet users in Guizhou province slowed down in 2014, with an annual growth rate of 6.7% [29,30], while the growth rate of the index in the same period was relatively large, so a relatively high elasticity coefficient appeared. Since 2017, the elasticity coefficient has been going down all the way, and the growth rate of the public’s attention to it has dropped significantly. The elasticity coefficients of 2018 and 2019 were both less than one, indicating that the growth rate of Guizhou netizens increased significantly in the past two years. According to statistics, the growth rate of Internet users [29,30] in Guizhou province in 2018 and 2019 was 12.5% and 11.24%, respectively, which maintained double-digit rapid growth for two consecutive years. Combined with Figure 1, the increase in attention to “AI + education” from 2017 to 2018 was negative, so its elasticity coefficient showed a relatively low negative value. However, the elasticity coefficient began to rebound after 2018, which may be related to the “Education Informatization 2.0 Action Plan” proposed by the state in April 2018, which emphasized the fundamental task of cultivating people by virtue, the concept of the integration of technology and teaching, and promoted the development of “Internet + education” while building a learning society based on the network for life.

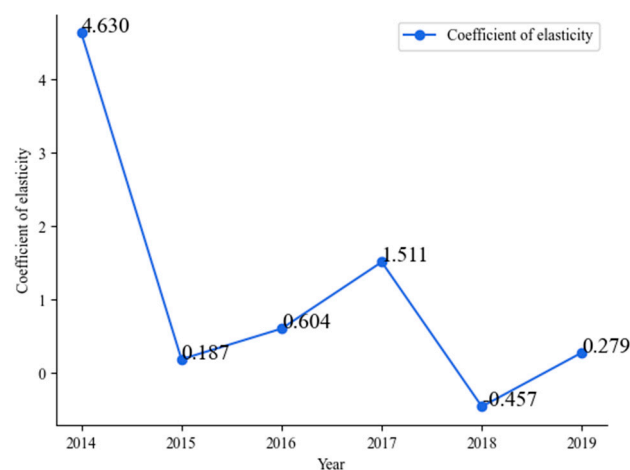


Figure 2. Change trend of the elasticity coefficient of attention of “AI + education” in Guizhou province from 2014 to 2019.

From Figures 1 and 2, it can be seen that (1) the public’s concern about “AI + education” in Guizhou province had a great relationship with the policies promulgated and implemented by the state and the province, and (2) to a certain extent, the growth of Internet users also increased the probability of the public using Baidu to search for relevant policy information, which plays a certain auxiliary role in the improvement of Internet attention.

4.1.2. Analysis of Regional Differences

Guizhou province is located in the hinterland of Southwest China, bordering Chongqing, Sichuan, Hunan, Yunnan, and Guangxi, and it is the transportation hub of Southwest China. Guizhou governs six prefecture-level cities and three autonomous prefectures (Figure 3).

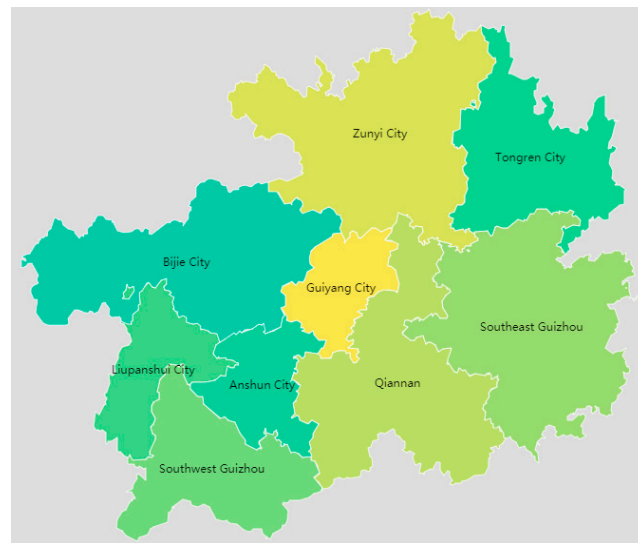


Figure 3. Geographical location distribution map of various cities (prefectures) in Guizhou province.

Guiyang, the capital of Guizhou province, is located in the central part of the province. Zunyi has the largest area under its jurisdiction. Anshun has the famous Huangguoshu Waterfall, and its future development is unlimited. According to the permanent resident population statistics of Guizhou in 2019 [31], from the perspective of cities (prefectures), Bijie has the largest permanent resident population, with a total of 6,714,300 people. Zunyi follows this with a permanent population of 6.302 million. Guiyang ranks third with a permanent population of 4,971,400. The permanent resident population of Bijie, Zunyi, and Guiyang accounts for 49.6% of the province. According to the sixth census, Guizhou has 54 ethnic groups, among which ethnic minorities account for 36.11 percent of the population. The number of the ethnic minority population is distributed in southeast Guizhou, Tongren, south Guizhou, Bijie, southwest Guizhou, Anshun, Liupanshui, Guiyang, and Zunyi in order. For thousands of years, all ethnic groups have lived in harmony and jointly created a colorful Guizhou culture. In recent years, all cities and prefectures in Guizhou province have actively responded to national policies, innovated education models, and vigorously promoted the introduction of artificial intelligence into classrooms to improve the quality of teaching.

In this paper, the Baidu search index of prefecture-level cities and autonomous prefectures in Guizhou province from 2013 to 2020 was examined by taking the city (prefecture) as the unit and using “artificial intelligence + education” as the keyword (Figure 4).

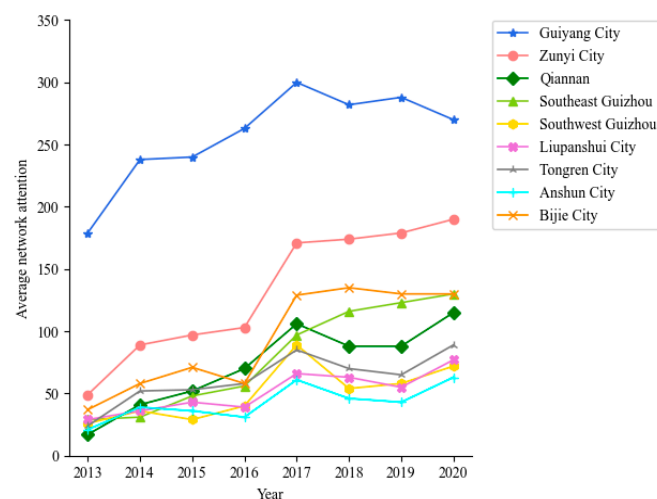


Figure 4. The mean change trend of “AI + education” network attention in various cities (prefectures) of Guizhou province from 2013 to 2020.

As can be seen from Figure 4:

1. From 2013 to 2020, Guiyang and Zunyi had the highest overall ranking of network attention of “artificial intelligence + education”, which were mainly concentrated in areas with good economic development and large populations. According to the statistics of various cities (prefectures) in Guizhou province from 2015 to 2019, the GDPs of Guiyang and Zunyi remained the top two, and the permanent resident populations also ranked in the top three for five consecutive years [31]. To a certain extent, steady economic growth can promote the integration of science and technology with education and teaching, in addition to accelerating the construction of a powerful country in education;
2. The promotion of the reform of an intelligent education mode was more obvious in the stage of higher education. Long et al. [19] emphasized that in the era of “artificial intelligence + education”, the teaching process in colleges and universities should be deeply integrated with artificial intelligence technology, and artificial intelligence should be used to help students gain educational happiness and liberate the productivity of teaching and learning. According to statistics, there are higher education schools in Guiyang and Zunyi. The implementation of this education and teaching process will also increase the public’s attention to relevant information, such as intelligent marking systems, online education, intelligent robots, children’s programming, and other aspects;
3. The Internet attention to “AI + education” in all cities (prefectures) showed a general trend of a slow rise. Among them, the attention of Bijie City, Southeast Guizhou, and south Guizhou increased slightly (except Guiyang and Zunyi), while Liupanshui, Tongren, Anshun, and Southwest Guizhou showed a slow growth trend. Due to the national training program carried out in recent years, elementary and secondary school teachers in various districts, counties, towns, and townships have been trained in, for example, micro-class and wisdom classroom to vigorously promote the introduction of artificial intelligence into primary and secondary school classrooms. During the 13th Five-Year Plan period, to promote the integration of wisdom campus, promoting the change in the way of teaching methods and learning in, for example, Guiyang, Zunyi, Liupanshui, and Anshun of “artificial intelligence + education pilot project” produced significant results and had a good demonstration role in driving and promoting the attention of the surrounding areas, and the development of regional network awareness also edged up subsequently.

4.2. Forecast Analysis

Based on the existing literature and previous analysis, it was found that the integrated development of “artificial intelligence + education” received widespread attention in Guizhou province. To better explore the future development trend of “artificial intelligence + education” in Guizhou province, based on the *ARIMA* model, this paper makes short-term predictions based on the fluctuation characteristics of data in recent years to provide a reference for the future development of regional intelligent education.

4.2.1. Application Verification of the *ARIMA* Model

Figure 5 shows the total value of the Baidu Index of the PC and mobile terminals of “artificial intelligence + education” in Guizhou province from 1 January 2013 to 31 October 2020, with the monthly average as the statistical unit and a total of 94 sample data. As can be seen from the original figure, the data showed a trend of a gradual increase year by year, and the variation of the fluctuations showed a nonlinear and nonstationary sequence. Therefore, it was necessary to transform the original data appropriately to make it have the characteristics of the *ARIMA* model.

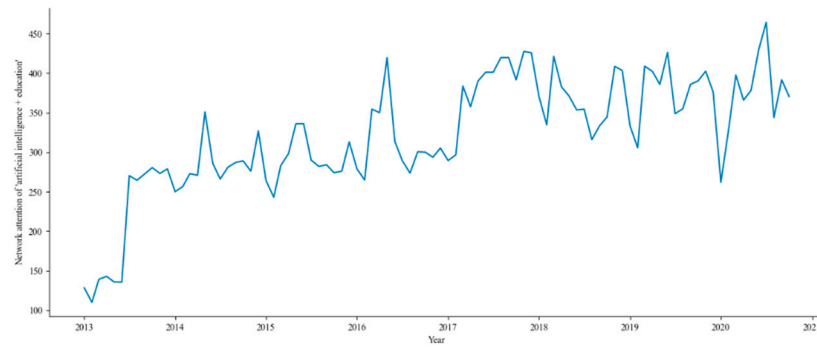


Figure 5. Total Baidu search index value of “AI + education” in Guizhou province.

Figure 6 is a diagram of the original sequence converted by the difference method. By comparison, it can be seen that the time series was close to the stationary series in the second difference, and the data showed strong independence. Since the mean value and variance of a stationary sequence would not change significantly, it was necessary to test whether the sequence of second-order difference met the stationarity requirements.

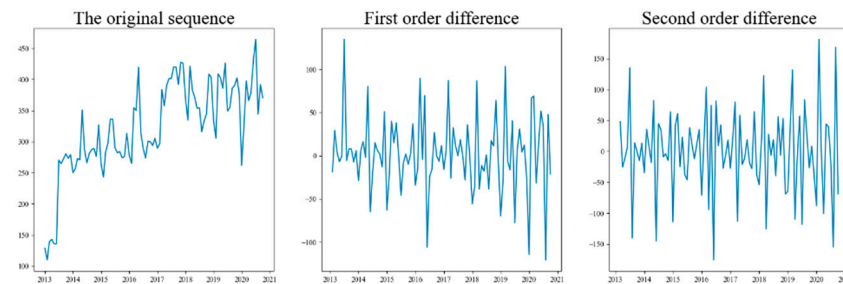


Figure 6. Sequence after differential treatment.

The stationarity detection results of the sequence of second-order difference are shown in Figure 7. It can be seen that the mean value and variance of the sequence tended to be constant with relatively small fluctuation. At the same time, according to the calculated results of the unit root (Table 1), the statistical value was less than the critical value of 1%, so the time series was stable at 99% confidence, in line with the stationary characteristics required by the ARIMA model. Therefore, on this basis, the ARIMA model could be used for prediction.

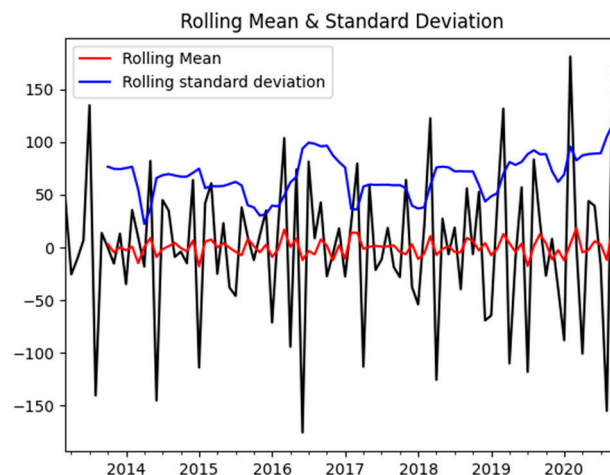


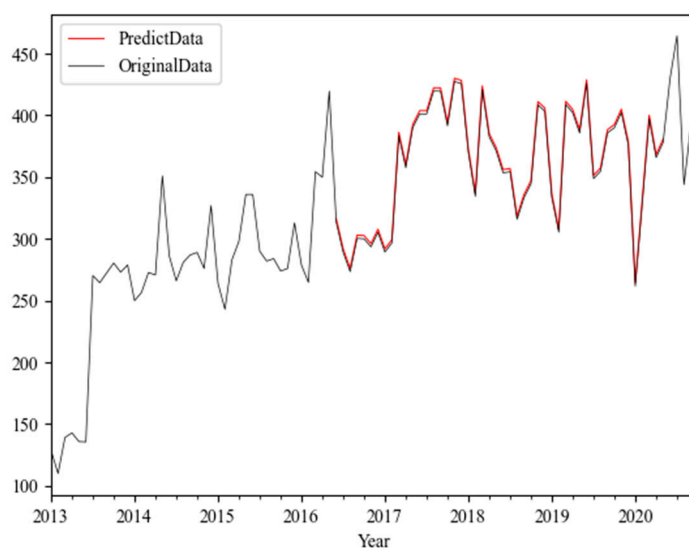
Figure 7. Mean and variance of the sequence of second-order difference.

Table 1. Unit root test results of second-order difference data.

Test Statistic	−5.912054
<i>p</i> -value	2.624777×10^{-7}
Number of Observations Used	81
Critical Value (1%)	−3.513790
Critical Value (5%)	−2.897943
Critical Value (10%)	−2.586191

After the above stationarity detection, the sequence after the second difference was stationary, so the parameter d of the model was two. To determine the best p and q parameters, this paper adopted the Akaike information criterion to calculate the $ARIMA(0, 2, 0)$ model with the lowest AIC value, as $ARIMA(0, 2, 0)$ was selected to predict the attention degree for “AI + education” in Guizhou province.

To analyze the availability of the $ARIMA(0, 2, 0)$ model, the monthly mean of the index of “artificial intelligence + education” in Guizhou province from June 2016 to May 2020 was selected as the test set. Figure 8 is the fluctuation graph of the original data of the test set and the predicted value of the model. It can be seen from the graph that the predicted value and the actual value change trend were consistent. According to the $RMSE$ result of 1.8590, the error was relatively small. Therefore, it was feasible to select the $ARIMA(0, 2, 0)$ model to predict the attention to “AI + education” in Guizhou province.

**Figure 8.** Fit diagram of the original value and predicted value of attention to “AI + education” in Guizhou province in a period.

4.2.2. Analysis of the Forecast Results of Guizhou Province and Its Cities (Prefectures)

Based on the change of the index of each city (prefecture) in Guizhou province over the years, the $ARIMA$ model was used to forecast nine regions, such as Guiyang City, Zunyi City, and Qiannan Prefecture. At the same time, two cities in the central region and the eastern region (Wuhan City and Shanghai City) were selected as the reference points for comparison with the western region. In the prediction process, the related process of “model application verification” in the Guizhou province mentioned above was adopted to build the prediction models for each city and each city (prefecture) in Guizhou province. Figures 9 and 10 show the prediction results.

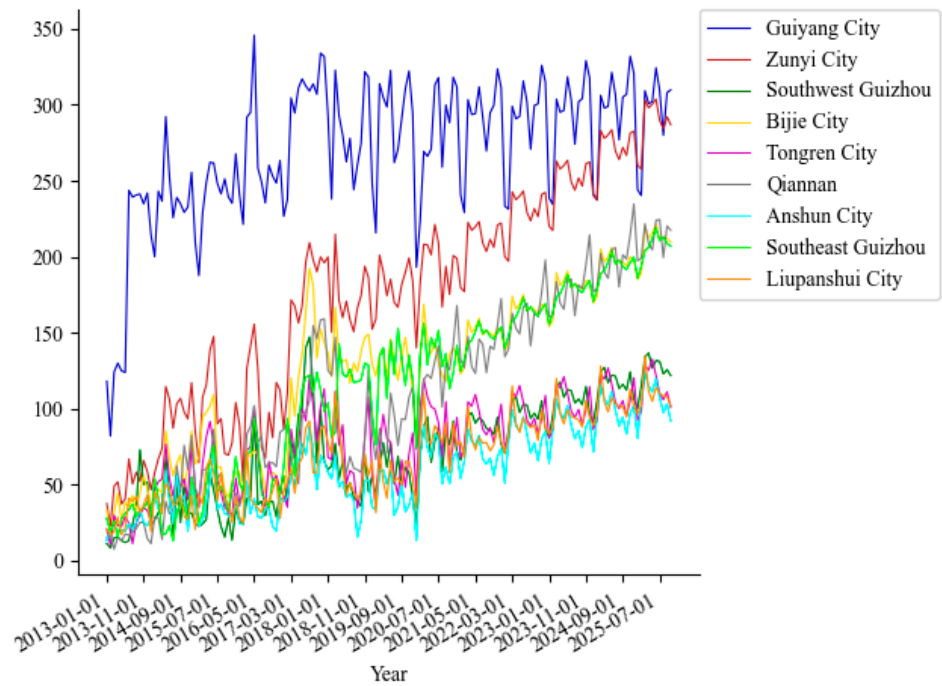


Figure 9. Forecast trend of “AI + education” attention in the cities (prefectures) of Guizhou province.

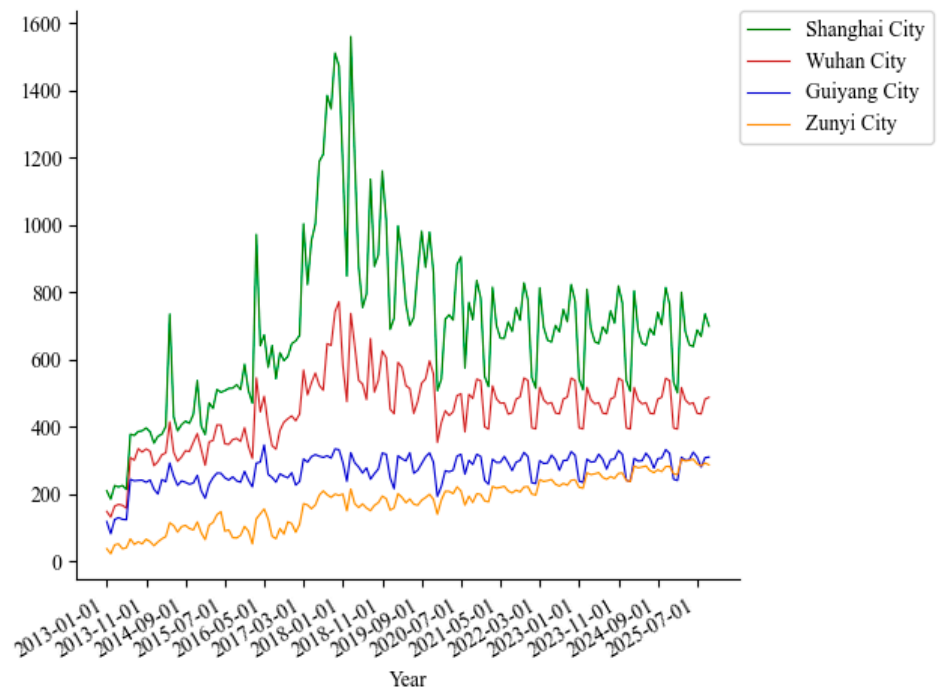


Figure 10. Forecast trend of “AI + education” attention in other cities.

As can be seen from Figure 9, the “AI + education” index of all cities (prefectures) in Guizhou province will maintain a trend of continuous growth in the next 3–5 years, which reflects that the public’s attention to the information related to the integrated development of “AI + education” continues to rise, and there is still a great space for development in the optimization and reform of the education model. (1) The index trend of Guiyang City remains stable and fluctuating, while the index of Zunyi City is rising year by year. It may catch up with Guiyang City in 2025. (2) The indexes of Bijie, Qiannan, and Southeast Guizhou are increasing year by year with a large rate of increase. The indexes of Bijie,

Qiannan, and Southeast Guizhou are likely to exceed 200 at the beginning of 2024, an increase of about 42% compared with the current situation. (3) The indexes of Tongren, Anshun, Southwest Guizhou, and Liupanshui show a gradual growth trend, which is in line with the changing trend of attention in recent years, and develops relatively slowly. As can be seen from Figure 10, there is a partial gap between the development of “artificial intelligence + education” in Guiyang and Zunyi and cities in the central and eastern regions.

The century-old plan is based on education. To promote the economic development of the western ethnic minority areas, priority must be given to the development of education to promote the deep integration of big data and the real economy and narrow the development gap between ethnic minority areas and Han ethnic areas or areas with developed education [20].

For the capital of Guizhou province and its second-largest city Zunyi, there is a certain gap between its development and that of some developed cities. According to the data of the National Bureau of Statistics, from 2015 to 2019, the investment growth rate of national financial education funds in Guizhou province was 13.6%, 18.9%, 10.8%, 9.9%, and 9.4%, respectively, and the investment of funds in recent years has slowed down year by year [32]. Therefore, the government should appropriately increase the proportion of education investment in the Guizhou region, as the policy is greatly inclined to this region. Pair assistance between cities will be carried out, and east–west university student exchange programs will be established to facilitate the integrated development of education and technology industries in the western region, based on resource sharing, complementary advantages, and industrial links between the east and the west. The government of Guizhou should increase the education budget, give preferential treatment, and vigorously introduce high-tech talents with high education to drive the development of urban science and technology utilizing education. At the same time, Guiyang City and Zunyi City should increase the promotion of the children’s programming market and vigorously cultivate potential talents in the field of artificial intelligence technology. Artificial intelligence education in higher education should develop specialized courses, the construction of a digital education ecological system, artificial intelligence and education, and make big data fusion development industry, services, agriculture, and other areas arouse the public more and more attention to better promote Guiyang and Zunyi city in western minority areas, such as with “artificial intelligence and education” in the process of the development of the level of developed cities in the central and eastern areas.

For cities in the middle position of development, such as Bijie, Qiannan, and Southeast Guizhou, according to previous studies, the allocation of education resources in autonomous prefectures such as Qiannan is insufficient in terms of teaching staff, school-running conditions, and funding investment [21]. Therefore, to implement intelligent education, the provincial system design should take care of the ethnic areas with weak economic foundations, increase the investment of regional education funds, and pay attention to the development of middle and higher vocational education, in addition to rationally allocating teacher resources, establishing professional training programs for teachers, comprehensively improving the quality of teachers, and promoting the comprehensive and in-depth application of modern information technology in the teaching process of primary and higher education. The government should encourage the cooperation between primary and secondary schools and universities and make full use of excellent teachers and experimental environments in universities so that students can understand the market prospect of artificial intelligence and, at the same time, build up the popularization of artificial intelligence-related knowledge among the public, reserve talents for intelligent development, and promote it to catch up with the development of provincial capitals.

Guizhou is a multi-ethnic community. The development of a specialized ethnic education structure is unbalanced, the proportion of minority science college students is low, and the students in the basic education stage have difficulties in scientific learning [22]. Science plays an auxiliary role in enlarging students’ thinking and intelligence and promotes

the development of information technology. For the four cities with slow development—Liupanshui, Anshun, Southwest Guizhou, and Tongren—the proportion of students in the basic education stage (primary school and general middle school) is 93.0% [31], which is far more than the students in higher education. The disadvantage of science in the basic education stage is one of the reasons that affects the slow development of “artificial intelligence + education”. Poverty alleviation should be promoted first, so we should pay attention to and promote the reform and innovation of basic education teaching methods. Quality education emphasizes the comprehensive development of students. First of all, we should correct the cognitive deviation of “main and minor subjects” between teachers and students. In the era of network information, there is no division of “main and minor subjects”. Secondly, we should encourage professional young teachers to find jobs in towns and townships in the region, spread new teaching models, and drive old teachers to use information software and innovate teaching models with the help of new technologies. Finally, the government needs to strengthen regional science teacher team construction, attach great importance to the primary and middle schools and polytechnic university courses of cohesion, and at the same time promote artificial intelligence technology application in primary and middle school teaching practices, let the student make contact with artificial intelligence much earlier, and make artificial intelligence become a basic element of students’ learning and life, serving to deliver diverse talents for higher education and promote regional development activity.

5. Conclusions

1. The time series characteristics of the network attention of “AI + education” in Guizhou province are obvious. In general, with the advancement of time, the public’s attention to the integrated development of “artificial intelligence + education” is on the rise, which is largely related to the implementation of national and provincial policies on artificial intelligence and education, as well as the growth of Internet users. However, in the last two years, the growth rate of public attention on AI-assisted education has slowed down significantly, almost leveling off, and a marginal diminishing effect is prominent. This also means that the development of AI-assisted education and teaching reform in Guizhou province has entered a stable period in recent years, and there is a certain gap with the national average level;
2. The spatial characteristics of the network’s attention to “AI + education” in Guizhou province are obvious. In general, the attention of cities (states) in the province is on the rise, but the rising heat is slowing down. The two cities with the fastest development, Guiyang and Zunyi, have attracted relatively high attention to the development of intelligent education. The three cities with more ethnic minorities, namely Qiannan, Bijie, and Southeast Guizhou, have slightly larger growth rates. Anshun, Tongren, Liupanshui, and Southwest Guizhou, the four cities in the southwest and northeast of Guizhou province, have relatively slow growth. With the use of modern technology to promote the reform of a talent training mode, the difference in “artificial intelligence + education” network attention among the cities (prefectures) in the province has a trend of narrowing year by year;
3. According to the prediction results of the *ARIMA* model, the attention to “AI + education” in Guizhou province and its cities (prefectures) will maintain a continuously rising trend in the next 3–5 years, but the extent of the increase is different in different regions.

To promote the reform of education in the western minority areas and build an integrated and intelligent teaching model, measures can be taken from the following aspects. For the cities that develop relatively fast in the minority areas, the state should increase the investment of educational funds, establish a policy of helping and supporting the eastern and western cities, and drive the development of the western industries. Local governments should strengthen AI market promotion, vigorously introduce high-tech talents, and promote the construction of higher education courses to narrow the gap with

the national average. For cities with medium development levels, local governments should rationally allocate teachers of secondary and higher education institutions and vigorously develop vocational education. At the same time, primary and secondary schools should strengthen cooperation with universities to promote the application of artificial intelligence in teaching. For cities with relatively slow development, the state should encourage the innovation and reform of the teaching mode of basic education, focus on cultivating students' innovative thinking abilities, and encourage teachers to use new technologies in teaching. Meanwhile, the local government should strengthen the development of regional science teachers and improve the quality and level of teachers' teaching to make better use modern technology in promoting the development of education in the western minority areas.

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