



# Implementation of Online + Offline Hybrid System for Tourism English Teaching Based on Sparse Clustering Algorithm

Shan Wang<sup>(✉)</sup>

Shandong Institute of Commerce and Technology, Jinan 250103, Shandong, China  
wsybel19780803@163.com

**Abstract.** With the continuous improvement of the message technique era, the Internet has gradually changed people's learning style. Blended learning mode has become a research hotspot of the organic combination of digital learning and classroom education. More and more education resources are integrated and utilized. By organically combining traditional learning with online learning, the institutional situation of educational informatization is gradually improved, and blended learning is formed, so as to realize students' initiative, enthusiasm and creativity as subjects in the learning process. The means adopted in this paper is sparse clustering algorithm, and more and more people begin to pay attention to the necessity of studying the clustering technique of high-dimensional data sets. Faced with high-dimensional data sets, people usually adopt the means of feature selection and dimension reduction to deal with them. The rows in the data matrix are regarded as independent and multivariate data objects, and these data objects are generated by a mixed model with several elements. Through the research in this paper, blended education is superior to traditional education, and it is suitable to be widely put into practice.

**Keywords:** Sparse clustering algorithm · Tourism English education · Hybrid system

## 1 Introduction

With the continuous improvement and change of the message age, traditional education has been difficult to meet the demand of creative talents in today's society. Traditional education often leads to which makes students as cognitive subjects present a passive acceptance state in the whole education process, thus affecting students' subjective initiative in learning [1]. Blended learning, as a new education strategy, provides a new idea and means for curriculum reform. But there are some problems in the process of practice [2–4]. Emphasis is placed on the joint participation of education teachers and students, and the joint activities of those who teach and those who learn are emphasized. Its essence is to promote students' deep learning. For a long time, educators have always advocated that learners can be taught in accordance with their aptitude, and individualized

education can be realized by using education machines. From simple education machines to the improvement and application of the present intelligent education system, the education software assisting in the classroom has been changing to meet the needs of education [3].

## 2 Related Theories

### 2.1 Clustering Algorithm

Sparse clustering algorithm is a clustering algorithm based on the similarity between data points. Its main advantage is that it can deal with large-scale data sets and maintain high clustering quality even when the data is sparse. Sparse clustering algorithms mainly include K-means, spectral clustering, DBSCAN and so on, among which DBSCAN (Density-Based Spatial Clustering of Applications with Noise) is a typical density-based clustering algorithm, which can get better clustering results in both dense and sparse data areas [5–8]. Recently, more and more people have begun to pay attention to the necessity of studying the clustering technique of high-dimensional data sets. In the face of high-dimensional data sets, people usually use feature selection and dimension reduction means to deal with them. One way to reduce the dimension of data objects before clustering is to use matrix decomposition. In terms of search engines, the corresponding categories of keywords can be automatically formed through clustering, thus realizing intelligent search [9, 10]. In order to better meet people's growing tourism needs and improve the service quality and efficiency of tourism, tourism English teaching has gradually become an important topic in the field of education. However, the traditional teaching methods of tourism English often have some problems, such as single teaching content, too much dependence on teachers and so on. In order to solve these problems, this paper proposes a hybrid teaching mode of tourism English online and offline based on sparse clustering algorithm, aiming at improving the teaching effect and satisfaction of tourism English by combining online and offline teaching resources and methods. This model-based clustering has been widely studied in recent years, and many means of feature selection and dimension reduction use this model-based clustering. The basic idea of model-based clustering can be expressed as: treat the rows in the data matrix as independent and multivariate data objects, and these data objects are generated by a mixed model containing several elements.

### 2.2 Hybrid System Implementation

Blended learning originated from E-learning in 1990s. Only when learners undertake appropriate tasks and know how to do them can effective learning take place. "Blending" comes from the practice of E-learning. Only a few courses can be applied to complete online learning, and most learning environments are composed of classrooms, synchronous and asynchronous transmission, and electronic resources [11]. Learning theory is the theoretical basis of instructional design. When implementing blended instructional design, it needs to be selected according to different specific situations. Since 1950s, learning theory has gone through different stages of improvement, such as behaviorism,

cognitivism and constructivism. Blended learning combines the advantages of traditional classroom education with online learning to serve the whole education and learning activities [12]. This combination is not a simple addition, but an organic combination means, which mixes learning environment, learning resources, learning media, learning means and other learning elements. Through such a combination, the learning effect can be optimized. Take You massive open online course as an example. In the platform class of “You massive open online course V8”, you can know the students’ knowledge in time and clearly. Then, you can publish the course assignments in the “Do some homework” column, and then announce the homework answers, so that students can check for gaps and catch up.

In 1996, an American magazine published a paper on LAN training. It marks that experts and scholars in the fields of educational technique and training have officially started to conduct relevant research on E-learning. After several years of research and improvement, the related theoretical system of E-Learning has gradually formed. This kind of education activity through the network has rich education resources and provides a new way for the interaction between teachers and students. Its appearance makes many experts and scholars think that E-learning will change the relationship between teachers and students in education activities, break the traditional educational structure and change the nature of education, thus replacing the traditional classroom education. Blended learning fully embodies the humanistic thought, which is determined by learners’ own conditions in terms of learning tools, learning environment, interaction between learners, formulation of learning content and pace. It has both the requirement of accepting explanations and the opportunity of individual learning. It can be said that the diversity of student support services is a great feature. You massive open online course has a rich course center and resource center, which greatly expands the learning content of a single course. At the same time, it is more convenient for students to use any electronic device to study anytime and anywhere by combining the P C and mobile portals of the platform. Massive open online course’s hybrid education mode combining online and offline effectively solves the pain points of traditional education means, and improves the education quality and students’ learning results.

From the philosophical point of view, the positions of cognitivism and behaviorism are objectivism. Objectivism holds that the world is composed of objective things and the relationship between their characteristics and objective things. People’s common understanding of objective things and their relationships constitutes knowledge. Knowledge can be transferred to everyone’s brain through education. The purpose of education is to impart and transfer knowledge to learners in the most effective way. In order to promote the beliefs, personalities and skills can be developed. Students can share their views with other learners and receive richer ideas from other learners. Through the pre-class massive open online course study, teachers can ask a certain group of students to make a 5–10 min micro-video of the message they accept and internalize, and show it in class, so as to achieve the effective education effect.

### 3 Online + Offline Hybrid System of Tourism English Education Based on Sparse Clustering Algorithm

#### 3.1 Data Mining in Teaching System

Sparse clustering algorithm belongs to the field of data mining. Now let’s talk about the application of data mining in education. With the popularization of computer and Internet, computer network technique provides good technical support for personalized learning, and Web-based distance education system has gradually become the most important education platform for implementing modern distance education. The 21st century is the era of knowledge economy, and the increment and change of knowledge, technological update and improvement bring benefits to all walks of life. Among them, the application of technique in education not only requires the original way to be reformed in form, but also accelerates the change of ideas and educational concepts, bringing the trend of educational informatization. Data mining is the process of extracting useful message from a large amount of data. Some original data are structured, while others are semi-structured such as text, graphics, images, etc. In addition, there are some networks that have no definite form of data. The classification diagram of Web mining is shown in Fig. 1.

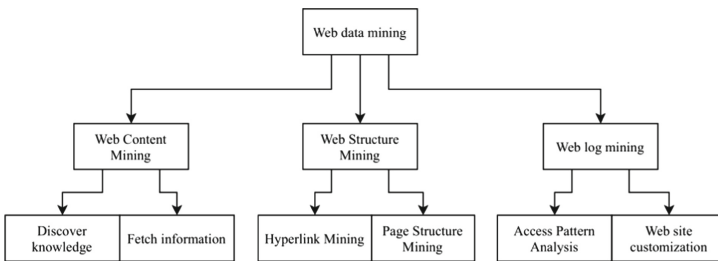


Fig. 1. Classification diagram of web data mining

With the advancement of educational informatization, multimedia computers have attracted more and more attention and attention from people, and are more and more widely used in daily education. Multimedia education software developed in the form of multimedia has also been more and more widely used. Network education is favored by more and more teachers and students because it is not limited by time and geographical environment and can show various and colorful courses to every Internet user. In reality, there are many ways to discover knowledge. Choose a specific means according to your own needs. It can be seen that data mining technique is rich in content and widely used, and experts and scholars from all sides will be involved in data mining. Therefore, the improvement of data mining has attracted many researchers or technicians in this field who have made achievements in database construction, mathematical statistics, artificial intelligence research and parallel computing. The speed of knowledge growth challenges people’s learning style. Driven by the improvement of technique and the rapid growth of knowledge, the traditional knowledge-based professors can no longer meet the requirements of the times.

In the education system, let  $I = \{i_1, i_2, \dots, i_m\}$  be the set of all items, that is, all fields in the database; let  $D$  be the set of all transactions, that is, the database; Each transaction  $T$  is a collection of items,  $T$  is contained in  $I$ , and each transaction can be represented by a unique identifier  $TID$ . Let  $X$  be the set of some items, and if  $X \subseteq T$ , then the transaction  $T$  contains  $X$ . Then the association rule is expressed as:

$$(X \subset T)X \Rightarrow_{(Y \subset T)} Y \quad (1)$$

$X \subset I, Y \subset I, X \cap Y = \varphi$ . The support degree  $s$  of the association rule  $X \Rightarrow Y$  is defined as:

$$s_{(X \Rightarrow Y)} = \frac{|T(X \cup Y)|}{|T|} \quad (2)$$

where  $|T(X \cup Y)|$  indicates the number of transactions with  $X \cup Y$  in the data set;  $|T|$  indicates the total number of transactions in the data set.

Confidence  $c$  indicates the strength of association rule  $X \Rightarrow Y$ , which can be defined as:

$$c_{(X \Rightarrow Y)} = \frac{|T(X \cup Y)|}{|T(X)|} \quad (3)$$

Among them, the data set contains transactions; indicates the number of transactions with in the data set.

With the improvement of network technique and computer technique, the browsing platform with beautiful interface and easy operation, and the personalized autonomous learning environment, the functions of network education system have been continuously enhanced. Distance education and autonomous learning have become the current trend of educational improvement. At present, the technique of data mining is widely used in many new interdisciplinary fields. How to find effective message with potential value from a large amount of data in the database is the main function of data mining, which has been widely used in many fields such as science, engineering, commerce and medicine. Intelligent education, a new research field formed by the combination of artificial technique and computer-assisted instruction, undoubtedly provides a good way to realize the educational goal of education students in accordance with their aptitude. Therefore, the research on intelligent education system has been put on the agenda day by day. The defects and deficiencies of the existing intelligent education system urgently need to be improved and perfected.

### 3.2 Blended Education Construction

Curriculum construction is mainly divided into two parts: one is the implementation of the curriculum, and the other is the improvement of education activities. The implementation of the curriculum should be based on the construction of learning forms and the integration of learning resources, and the improvement of education activities is based on the rational design of education strategies. Under the process of having a relatively complete learning form, the organic combination of education resources and education strategies will make the education more complete, and it is not easy to appear

self-contradictory situations in the specific operation process. Blended learning is to divide the traditional learning and the construction of online courses into two major components: one is the implementation of courses, and the other is the improvement of education activities. The implementation of the curriculum should be based on the construction of learning forms and the integration of learning resources, and the improvement of education activities is based on the rational design of education strategies. Under the process of having a relatively complete learning form, the organic combination of education resources and education strategies will make the education more complete, and it is not easy to appear self-contradictory situations in the specific operation process. The education design mode is shown in Fig. 2.

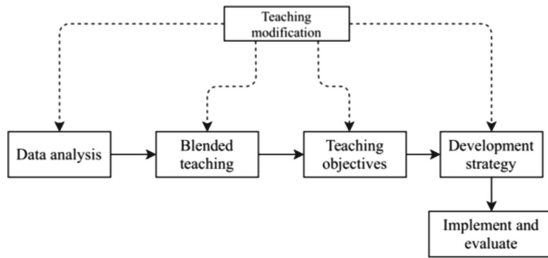


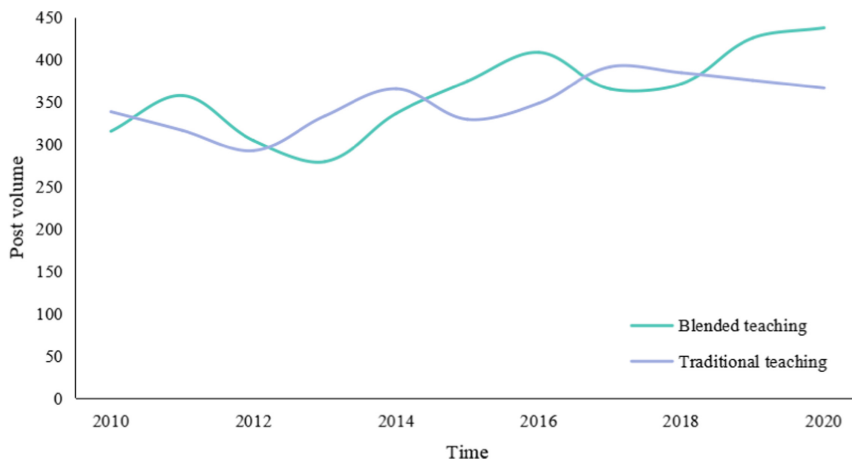
Fig. 2. Teaching design mode of hybrid education system

By summarizing and analyzing the opinions of the students, we can find that, different from the study of theoretical knowledge, the students show strong interest in learning practical knowledge. About “interactive electronic whiteboard”, you can learn some new education media, which will lay the foundation for future work. The learning unit part of the course mainly includes unit description, available learning resources such as videos, courseware, electronic reading materials, and learning activities such as online tests, online Q&A discussions, etc. It should be emphasized that the unit description should clearly introduce the unit objectives, learning activities, learning materials and evaluation means of this unit. As shown in Tables 1, 2 and Figs. 3 and 4, we can find that the research on blended education is increasing year by year.

Table 1. Research Trends of Learning Experience

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Blended education	315	357	304	279	336	374	408	365	371	425	437
Traditional education	338	316	292	333	365	329	348	391	384	375	366

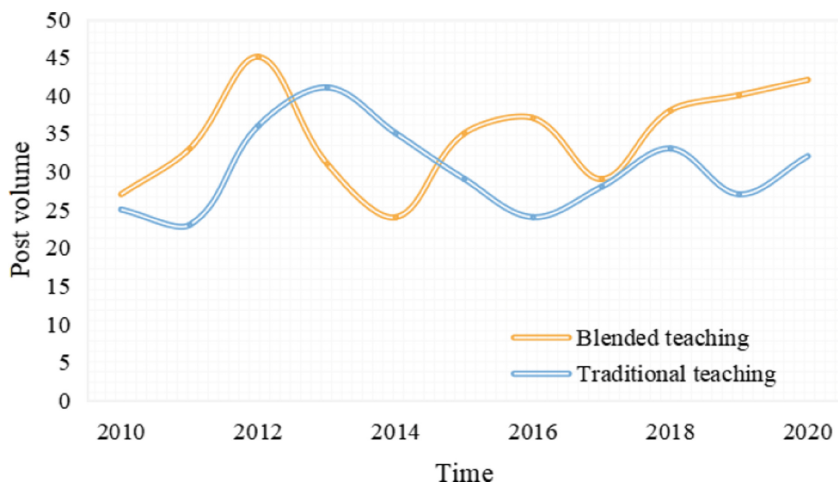
Blended learning is the integration of traditional learning and online learning. Its advantage lies in that students can know the learning content in advance through the



**Fig. 3.** Research trends of learning experience

**Table 2.** Research Trends of Blended Teaching

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Blended education	27	33	45	31	24	35	37	29	38	40	42
Traditional education	25	23	36	41	35	29	24	28	33	27	32



**Fig. 4.** Research Trends of Blended Teaching

online platform, and teachers can also know the students' interests and the degree of attention of the education content through the online platform. Students can have targeted understanding and preview in advance, and teachers also have a preliminary grasp of students' understanding. When they enter the classroom education stage, teachers can give targeted instruction to students in combination with the relevant message they have learned before class, and explain the difficulties in detail, saving a lot of time on education content. Using the function of flexible Starscream software can provide a lot of support for the improvement of learning activities. For example, by using the "teacher demonstration" function, teachers can directly project the prepared courseware resources onto students' computers to cooperate with synchronous lectures. Compared with the traditional projector demonstration education, this can avoid the problem that students can't see the courseware clearly because of the insufficient brightness of the projector or the backward position of the students. It is necessary to practice and strengthen the theoretical basis while learning, so that learners can better understand the theory of instructional design, and truly apply the theory of instructional design and systematic thinking to future education and life.

Modular design can realize the dynamic module management of the platform function. Teachers can freely create education modules and upload appropriate education resources according to students' needs and curriculum needs. Under the guidance of blended learning, the content of the course will be more abundant. At the same time, education activities can be fully integrated into the curriculum design, which can enhance students' interest in learning and their proficiency in using the platform.

## 4 Conclusions

Interest in online learning, which in turn will affect students' enthusiasm for learning.

**Improve teaching effectiveness:** Recommending personalized teaching resources for learners through sparse clustering algorithms can improve learners' satisfaction and learning effectiveness. At the same time, combined with offline personalized teaching services, the needs of learners can be better met.

**Improve the quality of teaching:** Through the hybrid teaching mode of online + offline, teachers can pay more attention to the learning process and needs of students, and improve the quality of teaching.

**Promote resource sharing:** Providing rich teaching resources through online platforms can realize the sharing and utilization of teaching resources and reduce the waste of educational resources.

**Adapt to the development trend of education:** The hybrid teaching mode of online + offline is in line with the development trend of modern education and helps to promote the development of education informatization and intelligence.

In conclusion, the online + offline hybrid teaching mode of tourism English based on sparse clustering algorithm has certain practical significance and application value. By combining online and offline teaching resources and methods, the effectiveness and satisfaction of tourism English teaching can be effectively improved. However, there are still some problems and challenges in the practical application of this model, which need further research and improvement.

## References

1. Rahman, M.M., Pandian, A.: A critical investigation of English language teaching in bangladeshunfulfilled expectations after two decades of communicative language teaching. *English Today* **34**(3), 43–49 (2018)
2. Sifakis, N.C.: ELF Awareness in English language teaching: principles and processes. *Appl. Linguistics* (2), 2 (2017)
3. Sato, T., Walton-Fisette, J., Kim, I.: Elementary physical educators' positioning in teaching English language learners. *Euro. Phys. Educ. Rev.* 203–220 (2019)
4. Michael, S.: The practice of English language teaching, 5th edition. *ELT J.* (1), 1 (2018)
5. Seraj, P., Klimova, B., Habil, H.: Use of mobile phones in teaching English in Bangladesh: a systematic review (2010–2020). *Sustainability* 13 (2021)
6. Gannon, S., Dove, J.: Artefacts, practices and pedagogies: teaching writing in English in the NAPLAN era. *Australian Educ. Res.* 1–23 (2021)
7. Jennifer, J.: International perspectives on English as a Lingua Franca: pedagogical insightsnew frontiers in teaching and learning English. *ELT J.* **1**, 99–104 (2017)
8. Yu, X., Liu, C.: Teaching English as a lingua franca in China: Hindrances and prospects. *English Today* 1–9 (2021)
9. Aronin, L., Yelenevskaya, M.: Teaching English in multilingual Israel: who teaches whom and how. A review of recent research 2014–2020. *Language Teach.* 1–22 (2021)
10. Santos, J., Passos, T.: Teaching English by teaching about race in Brazil. *ELT J.* **75**(1), 103–106 (2021)
11. Sidash, N., Roganova, M., Domina, V., et al.: Pedagogical consciousness formation of future university educators in the process of teaching English. *J. Educ. Res.* **8**(4), 1202–1211 (2020)
12. Predushchenko, O.: Individualized teaching English writing in China. *Int. J. Educ. Dev.* **11**(1), 1164–1171 (2020)