A Study of History Education in Macau Based on the Context of Big Data

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Abstract. This study is conducted on Macau education and the Macau Chinese Education Association. This paper provides a systematic review of the history of education in Macau. Born in the fertile soil of Macau, the Chinese Education Association of Macau has witnessed and participated in every major event in Macau's education sector since its birth. Therefore, a review of the history of education in Macau is indispensable to the study of the changes in the history of the Chinese Education Association of Macau. Through a systematic review of the history of education in Macau, it is possible to understand the background of the birth of the Association, the inevitability and contingency of its development, its participation in the development of education in Macau, its role in maintaining social stability, and the inseparable link between the history of the Association and the history of education in Macau. Inherit and carry forward the successful experiences of Macau education in civic and moral education, teacher management and patriotic education, and propose concrete and detailed paths for the future development of Macau education. Finally, the research findings are sorted out, the innovations and shortcomings of the study are summarized, and the research outlook is proposed. This study combines the study of history education in Macau with the support of big data models, and with the support of big data models, history education has been studied and analyzed in greater depth.

Keywords: Big data · Educational philosophy · The discipline of history · MobileNet

1 Introduction

Macau, like Hong Kong, is a special administrative region under the "one country, two systems" system of China [1]. Both have experienced colonial invasion and domination in their history, and both were reunited with the motherland in the 1990s through the efforts of the Chinese government. There are great similarities in both the historical experience and the economic, political, and cultural systems after the reunification [2]. Even though Macau has been colonized for almost 300 years longer than Hong Kong, and even though Macau returned to the motherland two years later than Hong Kong, the society of Macau has shown a picture of prosperity compared to that of Hong Kong, when Hong Kong is plagued with social problems and turmoil. The strongest contrast

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is that the citizens of Macau have shown a very strong patriotic passion even before the handover, and after the handover, they have developed peacefully and steadily under the guidance of the "one country, two systems" system. This paper explores new research based on the development of Macau to combine big data and history education for research, laying out a new way of thinking about such history education [3].

2 Feasibility Study on the Application of STEAM Education Concept to History Integrated Practical Activity Courses

2.1 History and STEAM Education

As a typical humanities subject, history has certain differences from STEAM education. However, the special nature of history among the liberal arts subjects determines the possibility of integrating it with STEAM education.

2.1.1 Educational Philosophy of History Subject and STEAM Education

The discipline of history, the embodiment of history in the field of education. The secondary school history curriculum, based on the results of historical research, guides students to take historical events in the past as the object of study, to analyze historical events with a scientific and dialectical perspective, and to draw historical conclusions as well as to develop their historical thinking skills. Three of the basic concepts of the 2017 GCSE history curriculum standards read [5], "To establish morality as the fundamental task of the history curriculum, to adhere to correct ideological guidance and value judgments, and to aim to cultivate and improve students' core literacy in the subject of history." "In addition, the standards stipulate that "moral education" should also "enable students to care about the fate of the country and the development of the world from a historical perspective [6]." The goal is to develop and improve students' core literacy in the subject of history [7].

2.1.2 History and the Educational Content of STEAM Education

History subject content is also extensive, inherently containing adequate subject area content in science and technology, engineering, art and mathematics from ancient and modern times [8].

STEAM education, in its implementation, uses a wide range of subject area knowledge as teaching content (or teaching context and resources), encourages students to use their existing knowledge experience in each subject area as a tool for problem solving, and promotes the flexible use of knowledge for the development of practical skills, which is intrinsically consistent with the content of the history subject [9].

2.2 History Integrated Practical Activities and STEAM Education Practice

Comprehensive practical activities in history are a way of teaching under the guidance of the new curriculum reform, and are an important initiative of the history discipline in cultivating students' autonomy; STEAM educational practice pays attention to students' practical and realistic problems, and serves to cultivate complex talents who can adapt to social development in the new era [10].

2.2.1 MobileNet

Deep convolution means that each convolution kernel corresponds to one input channel for convolution operation without changing the dimensionality of the input feature map. The number of input and output feature channels is guaranteed to remain unchanged. The size of the input and output feature maps are $W_{in} \times h_{in} \times c_{in}$ and $W_{out} \times h_{out} \times c_{out}$ convolutional kernel size is $c_{in} \times 1 \times k \times k$ where $c_{in} = c_{out}$. Figure 1 illustrates the simple depth convolution operation for the input feature map $c_{in} = 3$.

In the point convolution operation, assuming that the size of the input and output feature maps are $w_{in} \times h_{in} \times c_{in}$, $w_{out} \times h_{out} \times c_{out}$ respectively, the convolution kernel size is $c_{out} \times c_{out} \times 1 \times 1$. A simple point convolution operation is shown in Fig. 2.

Under the condition that the input and output feature maps are of the same size, the depth-separable convolution is about one-ninth of the computational effort of conventional convolution.

MobileNetV2, the second version of MobileNet, is the most commonly used lightweight convolutional neural network today. The structure of the bottleneck module of MobileNetV2 is shown in Fig. 3 where the dashed line indicates that the connection exists when the step (stride) of the intermediate Depthwise Conv2d is 1; otherwise, it does not exist. The ReLU6 activation function is used extensively in MobileNetV2. ReLU6 is a modified nonlinear activation function based on ReLU that restricts the maximum value of the output to 6, which is given by:

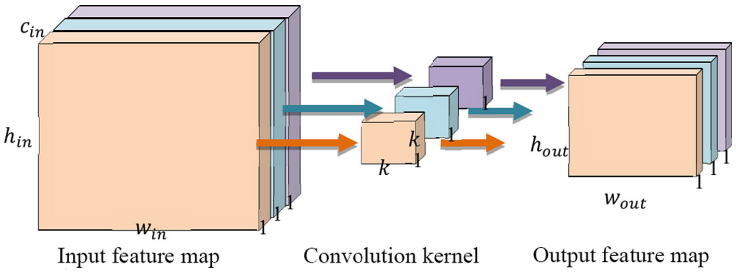

Fig. 1. Deep convolution

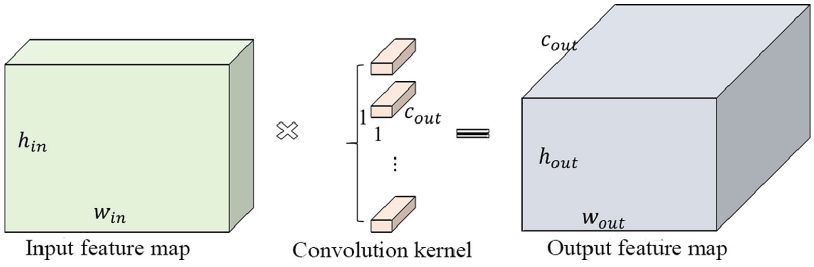

Fig. 2. Point Convolution

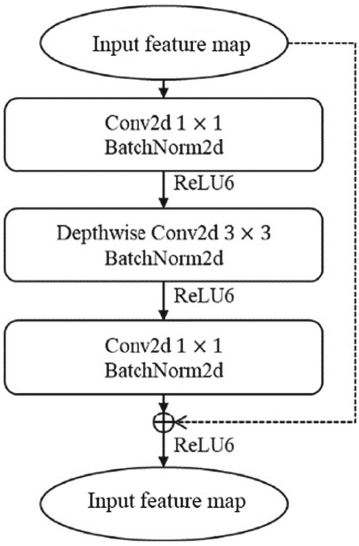

Fig. 3. Structure of the bottleneck module in MobileNet V2

$$ReLU6(x) = \begin{cases} 6, if, x > 0 \\ x, if, 0 < x \leq 6 \\ 0, if, x \leq 0 \end{cases}$$

MobileNet network was originally designed to build compact convolutional neural networks. So with the ReLU6 activation function, the network model can have a better numerical resolution when operated with low 4-bit precision on mobile devices.

3 Conclusion

History, with its inherent richness and flexibility, provides a new platform for STEAM teaching and learning, while STEAM education, drawing on the humanities like history, can enhance its humanistic nature and clarify its development direction. This case design is a simple attempt to combine the two. STEAM education theory fundamentally focuses on the development of multidisciplinary knowledge integrated problem-solving skills, but not a rigid combination, i.e., students independently apply various knowledge to solve problems. However, the design process for naturally mobilizing students' integrative thinking still requires teachers to engage in dynamic and independent exploration based on students' actual situations. The development of comprehensive problem-solving skills does not happen overnight, but requires long-term guidance and training to be present. In general, although STEAM education practice and history integrated practice activities are different in terms of implementation contents and methods, history integrated practice activities can thus expand the implementation fields and methods and gain new development. Therefore, in terms of theory and practice, the learning and integration of the two is practical and feasible, and a new path for the development of education implementation in the new era.

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