Exploring the Impact of Artificial Intelligence Learning Platforms on Interest in and Attitudes Toward Learning

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Abstract. Artificial Intelligence (AI) learning technologies and research in deep learning are rapidly expanding, and there is a lack of AI learning platforms to support students in related courses. At present, an understanding of the impact of learning on AI learning platforms on student interest in and attitudes towards learning is still unclear. This has thus become an important research topic in the field of AI. This study implemented an AI learning platform (Ladder) to deliver AI courses to students using two questionnaires (interest in learning and attitude towards learning). The study was implemented to survey 65 university students (males = 55, females = 10) at a national university in southern Taiwan, where 65 students were surveyed to obtain their opinions on their interest in learning and attitudes towards learning after learning on the AI learning platform. The results of the survey showed that about 40% of the students were interested in learning and had a positive attitude towards the AI learning platform. In addition, undergraduate university students may not always attach importance to AI. The findings of this study provide researchers and teachers with a better understanding of students' perceptions of their interest learning and attitudes toward learning.

Keywords: Artificial intelligence · Machine learning · Learning interest · Attitude toward attitude · Learning platform

1 Introduction

As one of the most successful machine learning methods in supervised learning, neural networks (NNs) have changed modern everyday life radically and have had a huge impact on even the most basic of our actions [1]. Because of its relative opaqueness, a neural network is known as a 'black box,' which makes it impossible to know the entire mode of operation, which has been the focus of discussion in recent years [2, 3]. An artificial

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intelligence learning tool based on deep learning and a plat-form that enables developers and learners to quickly reuse resources are the trends of the future [4]. If the students combine their learning with practical application exercises, they can enhance their basic knowledge of deep learning techniques, and their level of enthusiasm in this field will increase.

Deep learning has a minimum learning threshold related to basic programming skills, and students also encounter programming problems and challenges during the learning process. The process of learning a program can cause a variety of learning issues related to a lack of programming experience or a misunderstanding of the pro-gram, which can lead to negative attitudes toward learning [5]. The relevant literature on programming indicates that different teaching methods [6, 7] and teaching tools [8, 9] can be used to influence students' attitudes towards learning. Students interested in the process of learning a program are encouraged to have a positive learning attitude and to participate in the course [10] because attitude toward learning is one of the important factors that affects learning outcomes [7]. Furthermore, if new pro-gramming concepts attract the interest of students, they will learn them with a positive attitude [5]. However, the current understanding of students' interest in learning and their attitudes towards artificial intelligence is still unclear.

Therefore, in the current study, an AI learning platform (Ladder) was implemented to provide students with AI courses intended to enhance students' interest in learning and improve their attitude toward learning. According to this research purpose, we attempted to answer the following research question: After learning on an AI learning platform, what are university students' perceptions of their interest in and attitudes toward learning?

2 Literature Review

2.1 Artificial Intelligence (AI)

Traditional machine learning techniques are limited to processing data in its raw form. In contrast, deep learning allows models consisting of multiple processing layers to learn the features of data. This method has improved the state of speech recognition, graphic recognition, object detection, and many other such techniques [11]. A broad deep neural network-work (DNN) architecture consists of an input layer, sever-al hidden layers, and an output layer. In each layer, there are several units called neurons, which receive multiple inputs, weight their inputs, and generate output values by means of an activation function. Each neuron has a vector of weights associated with its input size and a bias optimized during training [12, 13].

2.2 AI Learning Platforms

Relevant AI learning platforms and research on this topic are rapidly developing. One such effort is a systematic review of studies by [14] that analyzed the last seven years (from 2014 to 2020) of AI adaptive learning systems, and identified key topics in the visualization of AI research objectives, AI learning interventions, and AI learning analyses. The fundamentals of deep learning techniques are important to college students in

related professions. Students need to acquire not only basic deep learning knowledge, but also must experience practical application of the acquired knowledge to complete learning tasks and develop a complete concept of deep learning.

Artificial intelligence learning systems provide different functions to help students learn and solve problems [14]. For example: [15] proposed the DL-OIET system to provide students with personalized learning and used neural networks to plan learning for students in order to enhance their English learning outcomes. [16] Used a deep neural network to propose an assessment of an e-learning platform and examined students' flow experience in order to facilitate personalized learning. [17] Investigated the implementation of a virtual learning environment and proposed an artificial neural network model intended to improve examination pass rates.

3 Research Method

3.1 Sample

In this study, an AI learning platform was implemented in a top national university in southern Taiwan for 65 students (male = 55, female = 10) with consent from all students. The students all had programming experience but no relevant AI experience.

3.2 Research Platform

Description of the Functions of the Artificial Intelligence Learning Platform (Ladder). In this study, an artificial intelligence curriculum was implemented for university students on an artificial intelligence learning platform (Ladder). This learning plat-form (Ladder) is a model-building platform using graphical machine learning structures with the following functions:

Layer Operations. The convolution layer is mainly composed of many different kernels that perform the convolutional operations on the input image, as shown in part (a) of Fig. 1. In this section, the user can adjust the number of neurons (Hidden Size) in the convolutional layer.

A convolutional layer is a set of parallel feature maps, which are formed by sliding different kernel sizes over the input image and performing certain operations. Thus, the user can adjust the number of neurons (Hidden Size), the Filter Width (also called the kernel size), stride, the Keep dimension (the same as padding), and other values to determine the output of the layer.

Learning Parameters. As shown in part (b) of Fig. 1, the neuron takes multiple inputs and adds them together by weighting each input, and optimizing the bias values during the training process. Then, the resulting values are passed through an activation function to pro-duce the output values. Therefore, the user can choose between the weight and bias modes, and the two learning parameters can be fine-tuned with more detailed variable settings.

Layer Proceedings. As shown in part (c) of Fig. 1, batch normalization can be standardized for each batch of data, and Dropout mode can be entered to randomly turn off some neurons to significantly reduce overfitting. Users can also choose a preferred activation function to non-linearly transform the neuron output values, which can all be used to mitigate the gradient disappearance problem in the depth model.

Output Manipulations. As shown in part (d) of Fig. 1, the user can select whether to flatten the output matrix or to output it in a specified shape to ensure that the next layer receives the out-put matrix shape.

Use of the Artificial Intelligence Learning Platform (Ladder). The actual operation process of this platform (Ladder) is shown in Fig. 1: (1) Step 1: The user enters the local data source. (2) Step 2: When the user adds a layer, a dialog box with default values will pop up, and the user can decide whether to adjust the values related to the layer operations related. (3) Step 3: The user can click on the new layer to display the attributes (a ~ d) on the right side and make changes. (4) Step 4: The user selects the type of task to be performed, e.g., indicates the number of categories if it is a category task. (5) Step 5: After editing the model, the user can download the model code and run the file locally for training.

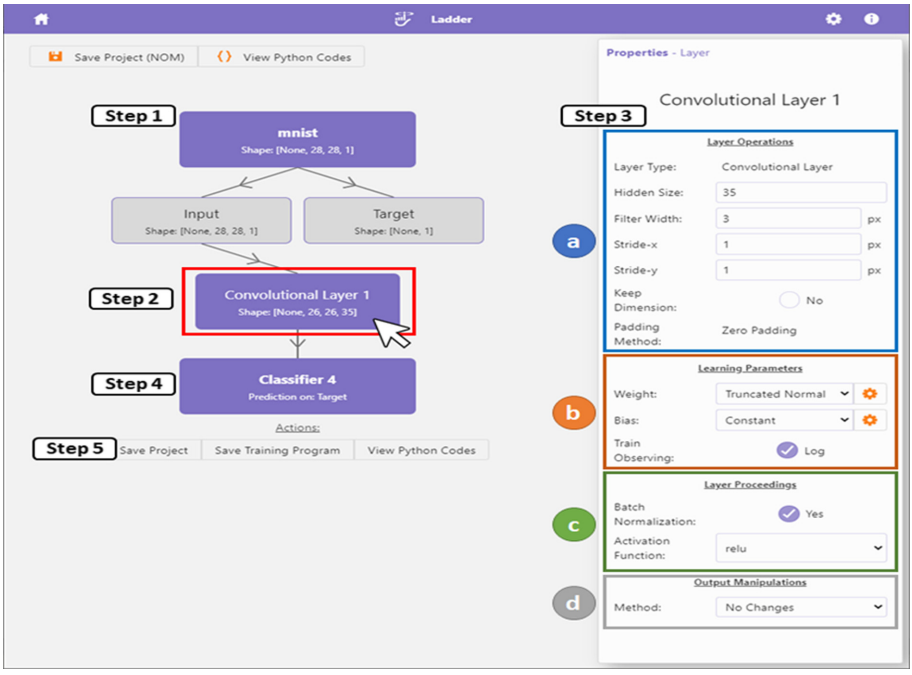

Fig. 1. Artificial intelligence learning platform (Ladder) functional interface and operation process.

The user can upload the training results to the platform and directly see if the loss function has been successfully converged and if the accuracy of the results has been stabilized in the visualization of the model training curve and in the presentation of the actual test results. The learning platform helps users build their models and produce a clear picture of the results for observation and analysis, further enhancing their impression of the effectiveness of deep learning.

3.3 Research Instrument

The instrument was modified from a study by [18], which had two variables including seven questionnaire items on learning attitudes and six questionnaire items on learning interests (Table 1).

Table 1. Descriptive statistics for learning interest, and learning attitude.

Dimension ($N = 65$)	Items	Percentages (%)					Mean	S.D.
		1	2	3	4	5		
Learning interest	Lint 1 AI courses are interesting to learn	0.0	3.1	33.8	44.6	18.5	3.78	0.78
	Lint 2 Learning about relevant AI knowledge is interesting	0.0	1.5	26.2	47.7	24.6	3.95	0.759
	Lint 3 Learning about AI-related concepts and knowledge is interesting	0.0	0.0	23.1	53.8	23.1	4	0.685
	Lint 4 It is interesting to practice the practical AI tasks in the AI course	0.0	0.0	40.0	41.5	18.5	3.78	0.739
	Lint 5 The teacher's guidance and teaching instructions attracted my attention in the AI course	0.0	1.5	40.0	41.5	16.9	3.74	0.756
	Lint 6 For me, AI courses are more interesting than other programming courses	3.1	0.0	46.2	33.8	16.9	3.62	0.878
Learning attitude	Latt 1 AI courses are valuable and worth taking	0.0	0.0	20.0	43.1	36.9	4.17	.741

(*continued*)

Table 1. (*continued*)

Dimension ($N = 65$)	Items	Percentages (%)					Mean	S.D.
		1	2	3	4	5		
	Latt 2 It is worth learning about AI	0.0	0.0	15.4	38.5	46.2	4.31	.727
	Latt 3 It is worth taking this AI course	0.0	0.0	21.5	43.1	35.4	4.14	.747
	Latt 4 It is important to understand the relevant AI information, including modelling, design models, and AI concepts	0.0	0.0	15.4	46.2	38.5	4.23	.702
	Latt 5 It is important to understand the concepts and applications of AI	0.0	1.5	16.9	41.5	40.0	4.20	.775
	Latt 6 I would actively seek out more relevant AI concepts and applications	0.0	0.0	36.9	43.1	20.0	3.83	.741
	Latt 7 It is important for everyone to take an AI course	4.6	15.4	29.2	29.2	21.5	3.48	1.13

4 Results

The findings of this study show that the students' learning interest in the AI course was positive. Almost 40% of students chose option 4, and others chose options 3 and 5. Only a few students chose options 1 and 2. The mean value of the questionnaire items ranged from 3.74 to 4, indicating a positive evaluation of students' interest in the AI learning platform. The results of the study showed that the AI learning plat-form can engage students' interest in AI.

In addition, the results show that students' learning of the AI course aroused positive learning attitudes among students. About 40% of the students chose option 4, and the other students chose option 3 and option 5. The mean value of the questionnaire item ranged from 3.48 to 4.31, which indicates that the students had a positive attitude towards learning when using the AI platform. In particular, for the Latt 7 item, the results showed that the percentage of students choosing the option varied across students. This means that undergraduates may not always value AI as a career path, depending on their own personal interests and career goals.

5 Conclusions

The purpose of this study was to implement an artificial intelligence learning platform (Ladder) and to identify students' perceptions of their learning interests and attitudes. The artificial intelligence learning platform provided students with systematic learning about AI and helped them to understand the concept of AI. The results showed that about 40% of the students positively evaluated their learning interest and learning attitude. They also showed an interest in and a positive attitude towards learning on the AI learning platform. In addition, the results indicated that undergraduate university students may not always value and move towards artificial intelligence as a career path. This study provides researchers and teachers with an AI learning platform for students and a better understanding of students' perceptions of their learning interests and attitudes. There are, however, some limitations to this study. The students were recruited from top national universities in the Department of Computer Science and Information Engineering, and some of the students may thus have already had positive learning interests and attitudes towards AI. This might have biased the results of the study. More importantly, future research could consider the implementation of AI learning platforms for university students from other disciplines and explore the impact of other variables.

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