Research on Artificial Intelligence Algorithm System for Medical Institutions Based on Construction Engineering and E-commerce

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Abstract. The architectural design of artificial intelligence and clinical institutions mainly uses digital twin technology and neural network technology. We have discussed Convolutional neural network and deep neural network, and put forward cutting-edge modeling exploration for the management system of building engineering in combination with Internet of Things technology. At the same time, we have integrated knowledge in the field of microbial medicine in architecture, and carried out detailed design for building engineering in this field, And various cutting-edge strategies have been proposed in architectural design using artificial intelligence technology, and research has been conducted to analyze and report on this situation.The preliminary CNN neural network regression analysis has achieved the function of predicting microorganisms, and we have published the algorithm and code.

Keywords: Clinical Science, Architectural Science, Artificial Intelligence, Neural Networks, Internet of Things, Digital Twins.

1. introduction

Intelligent buildings have emerged with human demands for information exchange, safety, comfort, convenience, and energy efficiency inside and outside buildings. The intelligent building and energy-saving industry emphasizes user experience and has endogenous development momentum. Building intelligence has become a development trend to improve customer work efficiency, enhance building applicability, and reduce usage costs. It is shown that in 2012, the proportion of intelligent buildings in newly built buildings in China was only about 26%, far lower than 70% in the United States and 60% in Japan, with huge market expansion space. The basic content of this article is to provide necessary strategies for integrating intelligent AI in the construction of clinical institutions.[1-5].

Figure 1. Multi disciplinary interaction in artificial intelligence

As shown in Figure 1, Intelligent building systems are a multidisciplinary and interactive research field. We will point out some research strategies and communicate with peers in necessary areas[6].

2. Mechanism of math

2.1. Biomimetic engineering of the human nervous system

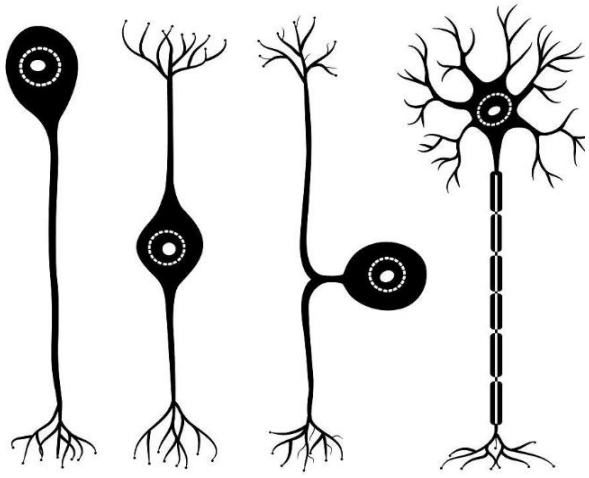

Figure 2. A Model of the Human Neural System

As shown in Figure 2, the biological neural network we demonstrate is the prototype of ANN, while the artificial neural network is another computing mode. The von Neumann machine is based on the abstraction of human information processing/memory, while neural networks are based on the architecture of parallel processing in animal brains. This is a multiprocessor computer system consisting of a large number of simple processing units highly interconnected, simple hierarchical communication, and adaptive interactions between each unit.

2.2. Principles of Computational Neuroscience

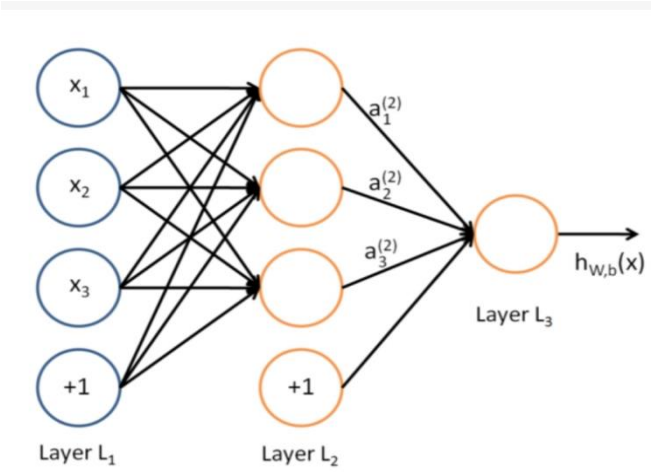

Figure 3. Mathematical structure and bionic mechanism of feedforward neural network model

Artificial neural networks are another computational model. The von Neumann machine is based on the abstraction of human information processing/memory, while neural networks are based on the architecture of parallel processing in animal brains. This is a multiprocessor computer system consisting of a large number of simple processing units highly interconnected, simple hierarchical communication, and adaptive interactions between each unit. As shown in the figure, artificial neural networks are divided into input layer, hidden layer, and output layer.

3. Model creation

Biosensing technology is a very active topic in the field of research and engineering technology. Along with bioinformatics, biochips, biocontrol theory, biomimetics, biocomputing, and other sciences, it is situated in the intersection of life science and information science. And biosensors are a typical interdisciplinary product, a delicate analytical device that combines a biological or biologically derived sensitive element with a physical and chemical transducer to generate intermittent or continuous digital signals, with signal strength proportional to the analyte. We believe that installing biosensors into medical buildings is feasible. We propose a bold idea that using biosensors as storage devices is feasible in construction projects. The most important aspect of the construction process is the installation of construction equipment, and the quality of installation directly affects the quality level of the building completed by the construction unit. In order to fully meet people's desire for quality of life in architectural design and installation, construction units must find ways to improve equipment installation management, create a scientifically effective solution, and ensure its installation quality. Therefore, we believe that the installation of biosensors should be combined with building engineering. The air bacteria detection instrument can be installed from the perspective of construction engineering as a method for obtaining data through neural networks to collect microbial environment monitoring instruments.

4. Model design

Figure 4. Application principles of the Internet of Things

We believe that the installation of the air microbiological sensor should be based on Figure 4, and we should strive to complete the data collection. It also requires interdisciplinary collaboration between construction engineering and computer engineering.

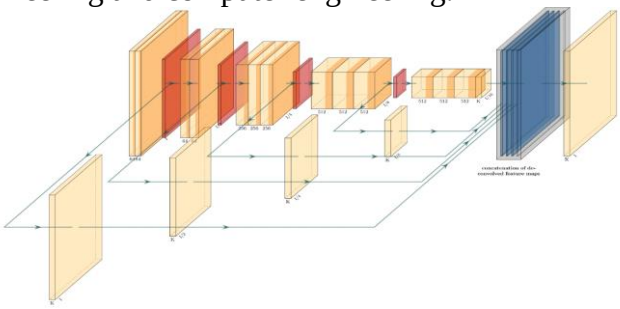

Figure 5. Convolutional neural network can recognize necessary images (through Internet of Things)

Convolutional neural networks can perform regression prediction on data, and we can analyze big data to achieve overall computer engineering implementation.

5. Result

Figure 6. The structure of CNN regression prediction

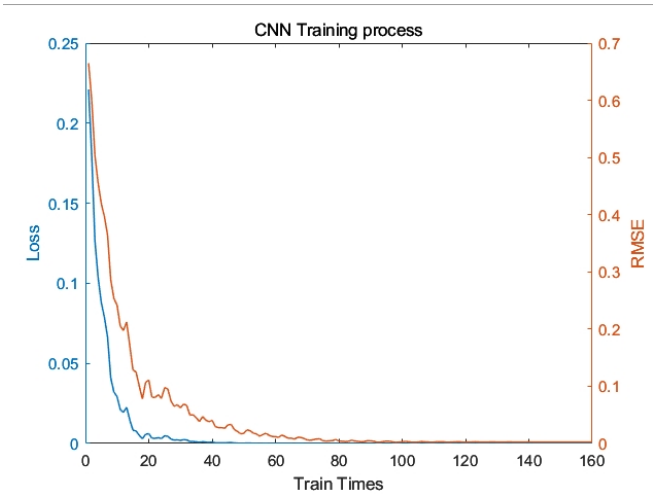

Figure 7. The training process of CNN

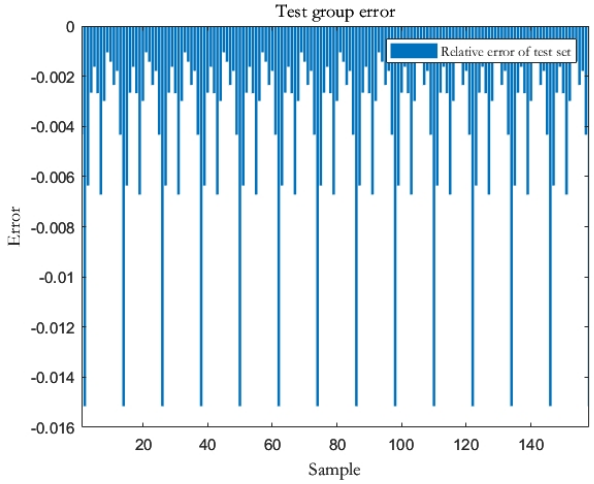

Figure 8. The relative error rate of the test set

6 with the following layers × 1 Layer array:
1 " Image Input 13 × one × 1 Image: 'zerocenter' normalization
2 " 2D Convolutional 16 3 × 3 convolutions: stride [1 1], padding [1 1 1 1 1]
3 " Batch Normalization Batch Normalization
4 " ReLU ReLU
5 " fully connected 1 fully connected layer
6 " regression output mean squared error
Output size of each layer network:
Layer 1 (nnet. cnn. layer. ImageInputLayer): Output size=[13 1 1]
Layer 2 (nnet. cnn. layer. Convolution2DLayer): Output size=[13 1 16]
Layer 3 (nnet. cnn. layer. BatchNormalizationLayer): Output size=[13 1 16]
Layer 4 (nett. cnn. layer. ReLULayer): Output size=[13 1 16]
Layer 5 (nett. cnn. layer. FullyConnectiedLayer): Output size=[11 1]
Layer 6 (nett. cnn. layer. Regression OutputLayer): Output size=[11 1]
The MAE of the training set data is 0.0061889
The MSE of the training set data is 4.1708e-05
The MAPE of the training set data is 0.004063
The RMSE of the training set data is 0.0064582
The R of the training set data is: 1
The MAE of the test set data is 0.0061774
The MSE of the test set data is 4.1688e-05
The MAPE of the test set data is 0.004165

The RMSE of the test set data is 0.0064566

The R of the test set data is: 1

As shown in Figures 6-8, we evaluated the overall performance of the convolutional neural network and plotted it.

Necessary code display.

```
Options. solverName='sgdm ';% Solver, sgdm (default) | rmsprop | adam
Options MaxEpochs=80;% Maximum number of iterations, default to 30
Options InitialLearnRate=0.03;% Initialize learning rate (default 0.005)
Options Plots='training progress';% Whether to display the training process, 'none' is not displayed (default) | 'training progress' is displayed
Options Validation Frequency=10;% Verification frequency, which refers to the number of iterations between which validation is performed
Options LearnRateSchedule='piece news';% Does the learning rate decrease after a certain number of iterations
Options LearnRateDropFactor=0.9;% Learning rate decline factor
Options LearnRateDropPeriod=100;% Iteration algebra when learning rate decreases
Options Plots='training progress';% Display training process
Options GradientThreshold=1;% Gradient limit, default to Inf
```

1. Temperature: Day 1 to the fourth day
2. PH value: Day 1 to the fourth day
3. Oxygen: Day 1 to the fourth day
4. Room number

Prediction: The number of microorganisms in this ward.

The preliminary data was obtained through manual measurement.

6. Discussion

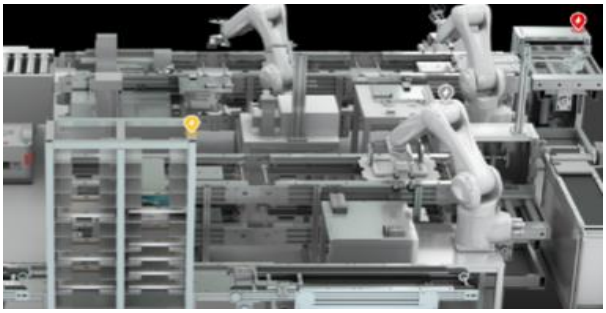

Figure 9. The Rise of Digital Twin Architecture

E-commerce is a new field full of opportunities and challenges. E-commerce helps to reduce costs for enterprises and improve their competitiveness in conducting business activities on the Internet. However, there are still many problems for enterprises to carry out e-commerce. Enterprises should adopt a proactive attitude towards e-commerce, accelerate the pace of enterprise reform and information construction, take corresponding countermeasures, promote the resolution of existing

problems one by one, and effectively promote the development of e-commerce. We believe that if we can simulate this system into a digital system, we can reduce the difficulty of operation and improve overall performance and e-commerce operability.

7. Conclusion

The research team has proposed an innovative concept by combining construction engineering, computer engineering, microbiology technology, e-commerce, and digital twins. In digital twins, sensors in construction engineering are operated, data is transmitted through the Internet of Things, and predictions are made through CNN. Finally, it is feasible to use digital twins for demonstration. We have also conducted preliminary experiments in the early stage, We hope to collaborate with other units around the world to make deeper breakthroughs in digital twin modeling.

Acknowledgments

ZHAO PENGFEI: Write thesis
ZHAO PENGFEI: Write thesis
YANG GUIBING: Write thesis
CAI WEIBIAO: Write thesis
LIANGYU LI: Review
YI QIN: Review and guide
This article has obtained ethical approval from Chifeng Cancer Hospital 1NKSO23
The experimental data in this article can be obtained from the corresponding author

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