ISSN: 2688-9323

# Application of Data Visualization Technology in Artificial Intelligence

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## Abstract

**Big data is the product of high-tech development in society, and is widely used in various industries such as military, medical, and e-commerce. Data visualization is a technology about the visual representation of data, which directly reflects a large amount of data through intuitive graphics. The method expresses the change, connection or trend of data and visualizes it. At present, the development of artificial intelligence is the leader of many scientific research technologies, facing a series of challenges and opportunities, and has broad prospects for development. Therefore, this article is dedicated to the combination of data visualization and artificial intelligence. By studying a variety of data visualization analysis in artificial intelligence, it explores the applications of data visualization in artificial intelligence and the relationship between data visualization and artificial intelligence. how to develop.**

## Keywords

**Big Data; Data Visualization; Artificial Intelligence Development Application.**

## 1. Introduction

Many studies have shown that when performing comprehension and learning tasks, pictures and texts can help readers better understand and remember the content to be mastered. Artificial intelligence has gradually been applied to many aspects of our lives. In the face of many discrete information and numbers, people often introduce data visualization technology to help analyze the results. The essence of data visualization is visual dialogue, which clearly and effectively conveys information and conclusions through images, and artificial intelligence is no exception. On the one hand, some basic quality inspection data of artificial intelligence and precise errors in production require data visualization to help better understand whether the quality is improving and the error is decreasing; for abnormal error reporting, visualization is also needed to help people more quickly Detect problems. On the other hand, how to obtain the first information, understand the number of customers, comments, and opinions of artificial intelligence in the development process, know the biggest needs of the public through data visualization, and improve people's pain points, etc., are all issues for us. Content worth digging into.

ISSN: 2688-9323

# 2. Data Visualization Tools

## 2.1. Excel

### 2.1.1. Features

Excel has a powerful function library, it has an intuitive interface, outstanding calculation functions and diverse chart tools, and can create data charts for internal use, which can not only process text information, but also organize data information. However, the colors and lines inside are limited, so it is actually difficult to use in some fields.

### 2.1.2. Application

Excel is mainly used in many aspects such as management, statistics, finance and economics, and finance. It can perform data entry, storage and retrieval; use simple and flexible features to help people make reports; after the data is processed, it can use charts for data analysis.

## 2.2. Tableau

### 2.2.1. Features

Tableau is easy to operate and does not need to master complex programming skills and statistical principles. It only needs some simple settings and operations to get the visual graphics you want.

### 2.2.2. Application

Tableau can manage data sources, and after importing data, it can be split and renamed; Tableau can create multivariate graphics: auditors can choose to create views and improve them according to their actual situation.

## 2.3. Magic Mirror

### 2.3.1. Features

Magic Mirror is a platform for visual analysis of big data. A large amount of internal or external data will be stored in it, and users can freely integrate, analyze and visualize these data. Business personnel can also make the charts they want by simply dragging and dropping.

### 2.3.2. Application

Users can create various visual charts according to their own prepared data sources. It can draw various types of graphics through the magic mirror, allowing users to truly explore and analyze data.

## 2.4. D3.Js

### 2.4.1. Features

D3.js is a data-driven document, which provides various simple and easy-to-operate functions, which greatly simplifies the difficulty of JavaScript to manipulate data. But the JS library renders in SVG and HTML5 formats, so like IE7, IE8 cannot use this feature.

### 2.4.2. Application

D3.js can draw various graphics, and it supports event handlers that can operate dom, and can be used in scenarios where there are more user interactions in project development.

# 3. Development and Application of Artificial Intelligence

## 3.1. Face Recognition

Based on facial feature recognition information, face recognition has been widely used in various scenarios such as access control, unlocking, and community access, providing many conveniences for social development:

ISSN: 2688-9323

Guaranteed privacy and security. Through face recognition on mobile phone and ID card verification, it can quickly identify whether the user is himself or not, which not only reduces the cost of manual review, but also protects people's privacy from being leaked.

Ensure security. Some users will encrypt their home locks through face recognition or fingerprint recognition, which not only speeds up the recognition speed, but also recognizes strangers and issues warnings to them.

### 3.2. Unmanned Driving

Unmanned driving technology has been continuously improving, and it has been applied in various scenarios. For example:

Logistics distribution. In fact, many industries will also use unmanned driving technology to help transport some goods, and deliver some items without contact. Especially because of the impact of the epidemic today, it is necessary to reduce human contact; on campus, you can also see Takeaway carts help transport food and reduce contact, which ensures a certain degree of safety and helps the logistics and distribution industry find a new direction for development.

Self-driving sanitation vehicles. Many sanitation workers are older, so they will apply unmanned driving in the field of sanitation to help improve work efficiency. Coupled with the aging population trend and the impact of the epidemic, the demand for autonomous driving is also increasing.

### 3.3. Personality Recommendation

Personalized recommendations have become a part of people's lives. The system will recommend people's favorite food, books and outfits according to their hobbies. It has been widely used in various fields.

In the field of e-commerce, platforms like Taobao and JD.com have added recommendation functions to their shopping websites or apps. The system recommends purchase suggestions to users based on their historical records, browsing records, interest searches, etc.

Informational content. People usually go to read, news, videos, etc. to get information. In recent years, many Internet products have added personalized recommendation functions. According to the user's hobbies, what he likes to listen to, and what he wants to watch, the corresponding information is recommended for him.

## 4. Application of Data Visualization in Artificial Intelligence

### 4.1. Medical Image Processing

As information technology is used more and more widely in the world, and the level of medical engineering development is getting higher and higher, making traditional methods of obtaining data and information often inefficient and even very difficult. Therefore, people apply visualization technology in the medical field. By building visual images and visual models, people can more intuitively understand the structure of the human body and the location of the disease. For example: digital virtual human: build a visualized human body through two-dimensional and three-dimensional display software, determine the corresponding research parts in each segment through various segments, and finally digitize all the research to become a virtual human. Then for surgeons without clinical experience, they can follow the superior doctor to simulate virtual surgery on the computer, and display the successful experience through computer language, so as to find out the most successful surgical method. Visualize multimodal medical images:

Medical imaging includes anatomical imaging and functional imaging. The former includes X-ray transmission imaging, computed tomography, etc.; the latter includes positron emission tomography, single photon emission tomography, etc. In the process of clinical diagnosis,

ISSN: 2688-9323

doctors can perform multiple modes of imaging on the patient's disease site, so as to obtain more accurate and comprehensive information about the disease. When patients go to different hospitals to take different images, these images will be multimodally fused in the computer to help doctors design a more comprehensive treatment plan.

## 4.2. E-commerce

For e-commerce companies, they will conduct digital analysis on their products. The visualization method can provide a reliable analysis solution for the implementation of the enterprise's sales strategy, and intuitively understand the development trend of the e-commerce and various product sales information through visual graphics. For example: the personalized recommendation mentioned above. By mining data, the system can help companies analyze customers' hobbies and shopping habits. By integrating the obtained data, it is possible to analyze which aspect a customer spends the longest time on, and establish a view to understand the customer's purchasing habits and preferences, and formulate more precise marketing strategies. Similarly, data visualization can also help display product purchase records and evaluations, what customers want to buy, and what functions they want the product to have. Through the visualized results, online questions and complaints can be realized; in addition, the system can also learn about market changes. In the model, a visual data representation between personality preferences in consumption and survey emails is established, so that the industry competitiveness of the enterprise can be improved. Enterprises can also directly understand their own storage and sales through data visualization, and can also map demand through the purchase location, so that they can intuitively know where mass production should be.

## 4.3. Network Social Media

People socialize more and more widely, such as QQ, WeChat, Weibo, etc. are relatively common social media software. For large-scale network media software, such as People.cn, China.com, blogs, etc., they are all platforms to learn about information and news. In order to improve the efficiency of dissemination, different styles will be displayed on data visualization at home and abroad. People clearly know that if these data cannot be well controlled, we will all be submerged in the ocean of data, so people introduced data visualization, through bar charts, Graphics such as line charts allow people to understand the information and knowledge behind social media more intuitively. For example, in the news media, if words are matched with charts and data, richer content can be presented; if news is combined with many graphics, the audience can understand it at a glance. In social software, we can often create our own homepage, which is to use the method of data visualization, so that others can directly understand some key information of the other party when they see the homepage; main information of . It provides a visual summary of its distribution in time, place, and crowd, which allows people to obtain the information they want from numerous social media information. Similarly, for large-scale online media, Google Street View animations use visualization methods to restore the specific process of events in 360 degrees. The visual effects are shocking, which provides accurate and intuitive information for an event report, allowing people to understand more deeply When, where, and what impact the event took place.

## 4.4. Help Smart Products to Improve

As mentioned above, in the improvement of artificial intelligence, visualization is needed to help establish data analysis and abnormal retrieval. The basis of artificial intelligence is mainly a large amount of computing power and data resources. For machine learning, the components inside are too complicated, so data visualization is needed to help increase its transparency. For complex data and complex patterns, it is necessary to increase visualization effects and extract key information, thereby reducing visual clutter. For example: use the graphics of the service

ISSN: 2688-9323

to reflect the data information, and users can view the information of the product through the website. In this way, there is no need to search for keywords from a large number of language information, and the information of each part can be seen by directly creating an image. Enterprises can also use different colors or layered colors to reflect the key content, development trends, advantages and disadvantages of the smart product by color-painting different types of product data. Similarly, the manufacturer can create a graph of the customer's opinion and evaluation data, and then understand the degree of improvement of the product, and try to improve each function of the product as much as possible. Not only that, but visualization can also help products sell. Use the chart to quickly show which time period of a day or a week has more customers, and which product is selected more times at the same time, we can reasonably determine the product promotion time based on the results, and continuously pass the products with fewer choices through customers comments to improve.

# 5. Long-term Cooperation between Data Visualization and Artificial Intelligence

## 5.1. The Relationship between Data Visualization and Artificial Intelligence

### 5.1.1. Visualization is the Core of Artificial Intelligence Systems

The core of visualization lies in how to express and transmit information. With the development of artificial intelligence, the use of visualization to build understanding models will become the use of artificial intelligence to explain content. The key point of visualization is to establish an effective channel for users and data to directly understand by providing a display of data and knowledge, so as to help people find their underlying laws. In the words of Liu Shixia, data visualization is the soul eye of artificial intelligence. The significance of intelligence is to build various types of frameworks, learn various styles of language description, perform various rhetorical techniques, and finally quickly create visual stories in artificial intelligence that meet audience expectations and fill them with vivid pictures. Whether it is machine learning of artificial intelligence or natural language processing research, it can be integrated with visualization technology.

### 5.1.2. Visualization Technology and Artificial Intelligence Complement Each Other

Visualization is widely used in many industries, and one of the biggest changes in artificial intelligence is the development of image recognition and speech recognition. At present, artificial intelligence will use data visualization to integrate existing data resources to create an innovative process. At present, artificial intelligence has also broadened multiple growth paths for data visualization, bringing new opportunities and challenges. While helping the innovative application of visualization technology, artificial intelligence is also constantly learning from it and finding opportunities for its own development. For example, intelligent features, visual automatic layout and generation, etc. The innovation of artificial intelligence technology has improved the efficiency of visual analysis, enriched the connotation of visualization technology participation, broadened the channels of visualization applications, and provided a medium for information transmission in the era of big data. Visualization technology enhances the ability of artificial intelligence in-depth research and learning, and the technology continues to improve in the process of improving intelligence. Through the application of artificial intelligence technology, visualization technology will penetrate into more industry fields, making visualization a gospel for major enterprises to meet customers' more generalized and diversified information needs.

## 5.2. Data Visualization and Artificial Intelligence Docking

If data visualization is to be combined with artificial intelligence, it is necessary to realize the connection between the two. So how do the two work together? We know that teaching is

ISSN: 2688-9323

beneficial to each other. When teachers impart knowledge to students, students can give feedback based on the knowledge they have learned, so that they can apply the knowledge they have learned in their lives. When they face mistakes, they can give feedback to the teacher in time, and the teacher can then revise and face the mistakes. Problems can be worked out together to find better solutions, and the two parties can make progress together, thus realizing the mutual benefit of teaching and learning. Similarly, artificial intelligence and data visualization can also be regarded as this kind of relationship. If one party wants to reflect something on the other party, it needs to transmit the content, let it produce corresponding changes, and then judge whether it is correct based on this change. These problems can be solved in time and monitored in real time, which realizes the connection between the two.

## 6. Summary

At present, in the research of artificial intelligence, the application of visualization technology can be found in our daily life. On the one hand, data visualization realizes the operation of data through data sorting, information search, and graphic display; on the other hand, it expresses data in an intuitive and clear way, and describes areas that are difficult for people to recognize in a simple way. There are also various types of data visualization, including scientific visualization, information visualization, and visual analysis. This article extends from data visualization to its application in various aspects of artificial intelligence. Before that, this article first discusses artificial intelligence. Artificial intelligence has penetrated into many fields around us. At present, the development of artificial intelligence has become a huge driving force for the advancement of the country. Artificial intelligence should be continuously applied to all aspects of enterprise management to help managers automate routine things. The scientific and technological progress brought about by artificial intelligence will promote the rapid development of the economy and the improvement of work efficiency. Its rise is also very likely to create new products and services, and it will also drive the common development of other industries. On the one hand, visual analysis plays a huge role in improving the basic data quality and interpretability of artificial intelligence; on the other hand, the advancement of artificial intelligence technology has driven the development of visualization technology. The application of visualization technology in artificial intelligence, including in social media, medical engineering, etc., presents the traditional data in artificial intelligence in a more intuitive way, making the data more intuitive and convincing. Technology is advancing, society is developing, and data visualization must also adapt to the needs of the times. Whether it is complex data or graphics with complex relationships, it has built a new bridge for artificial intelligence, allowing the development of artificial intelligence to keep pace with social development. Things that are not easy to find in other forms. On the one hand, the innovation of artificial intelligence technology has improved the efficiency of visual analysis, enriched the connotation of visualization in the field of artificial intelligence, broadened the development channels of visualization in the future, and provided a bridge for the transmission of information in the era of big data. On the other hand, visualization enhances the ability of artificial intelligence to conduct in-depth research and learning in various fields, and provides a technical foundation for the development of all walks of life. At present, the cooperative research on visualization and artificial intelligence continues to deepen, and its application in every industry shows great potential, which provides more directions worth trying for the development of scientific research. We believe that this is even more important for the development of a country. Works like an engine.

ISSN: 2688-9323

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