

# Cloud sharing defect monitoring system based on image processing technology

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**Abstract:** At present, there are a series of monitoring systems for defects in various products in the industry, but various monitoring systems have certain limitations and deficiencies in the current market application. Therefore, after a series of reflections and improvements, a cloud-based shared defect monitoring system based on image processing technology was established to locate the defect's product with the highest efficiency, analyze and guide subsequent repair and treatment solutions, upload the data to the cloud, and share it with the production department, quality inspecting departments, management departments and other users, constantly test and optimize, and ultimately improve product quality.

## 1. Introduction

Modern society is an industrialized society. With the continuous development of industry, industrial products are applied to all aspects of life. In order to ensure the accuracy and safety of industrial products in the field of application, defect monitoring of industrial products has become increasingly important. Most of the existing monitoring systems are inefficient and costly. The cloud sharing defect monitoring system based on image processing technology introduced in this article is to use image processing technology, fully automated production process management, to carry out pipeline data collection for products on the production line, to automatically identify defects or faults in the image, to accurately determine and Mark the type of the defect, upload it to the cloud and conduct a defect alarm, analyze and guide the subsequent repair and treatment plan, and interact the information between the production department, quality inspection department, management department and other clients. This cloud-based shared defect monitoring system based on digital image processing technology has largely solved the shortcomings of low efficiency, low accuracy, large cost, and waste of manpower and resources of traditional defect monitoring systems. The use of digital image processing technology and cloud sharing technology makes the production more precise and the division of labor more clear. At the same time, it reduces the company's labor costs, saves financial resources, and realizes the integrated development of machine intelligence.

## 2. Detection system design

### 2.1 Overall design

The cloud sharing defect monitoring system based on image processing technology consists of three parts: industrial camera, computer, and display. As shown in Figure 1:

During the defect monitoring process, the product to be inspected enters the light source area through the assembly line, and the industrial camera takes photos and collects data. After uploading to the computer, the computer uses image processing technology to collect and analyze the texture image on the image surface, and segment the captured image step by step, so that the product surface defects can be classified according to their unique regional characteristics. Further analyze the target area of the scratch to make the range more specific, accurately determine and mark the type of the defect, and upload it to the cloud. At the same time, perform a defect alarm and analyze and guide the subsequent repair treatment plan. Information is exchanged between user departments such as the production department, quality inspection department, and management department, and

the monitoring results are displayed through the display. Production departments can optimize production and test tuning based on the results of defect monitoring; quality inspection departments can effectively supervise and manage production in real time based on the monitoring results; management departments can also strengthen overall planning of various departments, multi-department division of labor, cooperation Improve product quality.

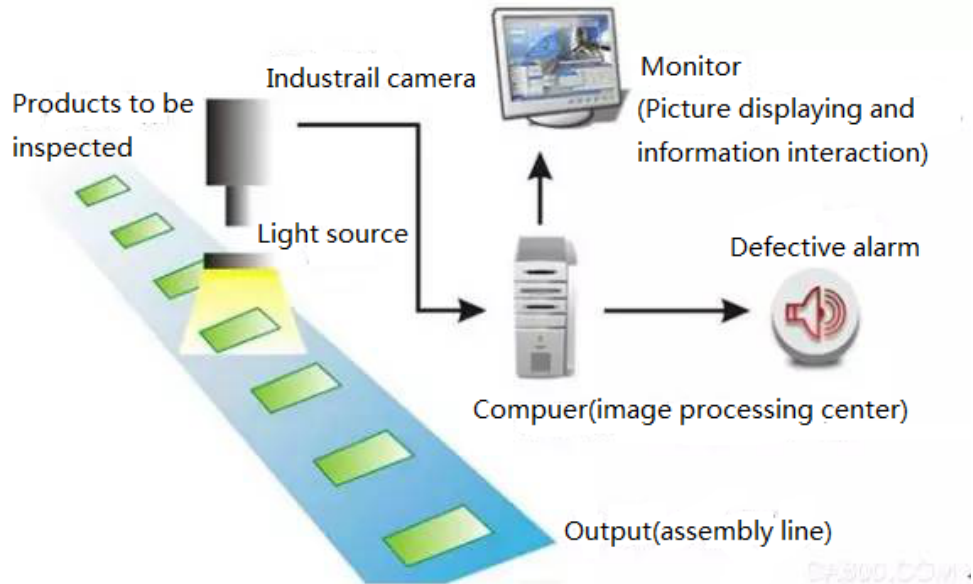


Figure 1 Defect detection system model

## 2.2 Image processing technology design

In the cloud sharing defect monitoring system, image processing technology is mainly used to realize the function of automatically identifying defects or faults in images and accurately determining the type of defects. It mainly includes two parts: defect detection and defect classification:

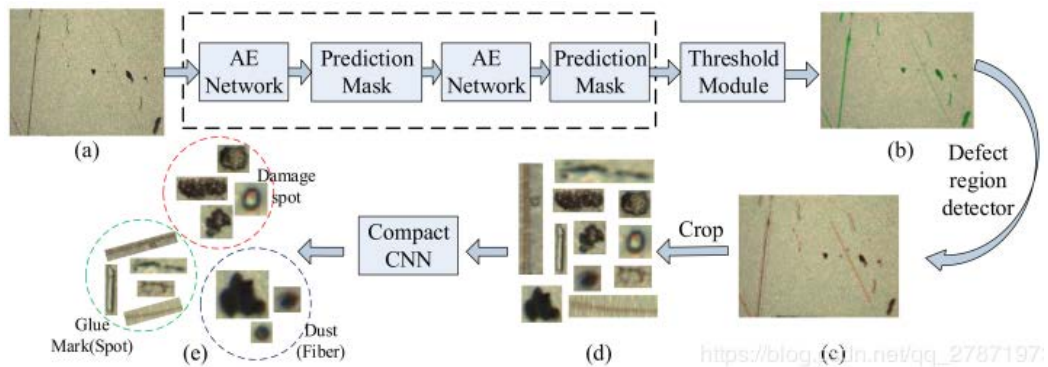


Figure 2 Defect classification process

### 2.2.1 Defect detection design

Defect detection mainly includes: selecting and extracting images, calculating the difference between the image to be measured and the standard image with respect to grayscale, and determining whether there is a defect by comparing the difference with a set threshold.

Suppose the template image as  $T(i, j)$ ,  
the image to be detected as  $S(i, j)$

Matching images subtracting images (differential image) as  $D(i, j)$ ,  
 $Th$  Set threshold

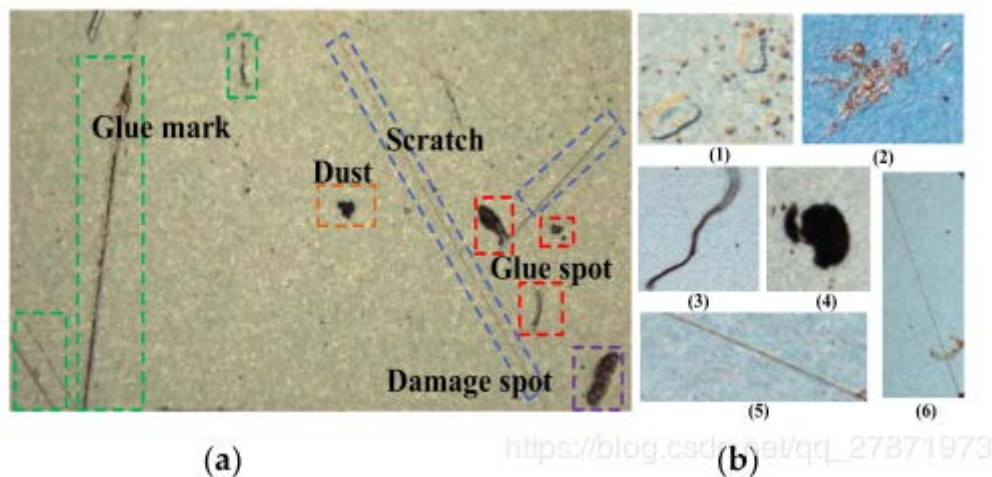
$$D(i, j) = |S(i, j) - T(i, j)|, \begin{cases} D(i, j) < Th, \text{ Non defect} \\ D(i, j) \geq Th, \text{ Defect} \end{cases}$$

[https://blog.csdn.net/qq\\_40719550](https://blog.csdn.net/qq_40719550)

Figure 3 Principle of defect image difference method

### 2.2.2 Defect classification design

The cascaded self-encoding network converts the input defect image with high pixels into an image based on semantic segmentation, and then classifies the defect area after semantic segmentation by CNN.



[https://blog.csdn.net/qq\\_27871973](https://blog.csdn.net/qq_27871973)

Figure 4 Defect classification

For industrial defective parts, because the features are not too obvious, they are often only a small piece. When selecting the network, we must consider the fusion of shallow features and deep features, so that the main features will not be lost. If the entire scene image is particularly large and the defect features are relatively localized, after convolving the image, the features are basically non-existent. At this time, you can consider segmenting the scene image. For example, a scene image is divided into four parts, which can be horizontal It can also be divided vertically.

### 2.3 Cloud Sharing Technology Design

The establishment of enterprise cloud disks or cloud databases can be used to achieve real-time monitoring and management of production lines by various departments of the enterprise, in order to improve the production quality rate.

Personal cloud disks are generally shared through sharing. Enterprise cloud disks use file sharing to achieve file sharing, which is equivalent to setting up a public folder. Members in the folder can view or edit according to their different permissions. Document. In comparison, the enterprise cloud disk is more suitable for companies to use. Among the currently well-known corporate network disks, Lenovo Enterprise Network Disk and Yifang Cloud have done a good job of collaboration. Since Yifang Cloud focuses on collaboration, its functions are more in line with the operating habits of ordinary users.

Similarly, enterprises can easily complete cloud database application and creation in the RDS console, and the RDS instance can be ready and put into use within minutes. Users can perform unified management on all instances through the fully-functional console provided by RDS. Cloud database has functions such as automatic single point of failure switchover and automatic database backup to ensure high availability of the instance and data security. Provides 7-day data backup for free, which can be restored or rolled back to any backup point within 7 days. The cost paid by RDS is much lower than the cost of self-built database. Users can choose different packages according to their needs and get a complete set of professional database support services at a very low price.

### 3. Feasibility analysis

#### 3.1 Defect classification analysis

Defect classification uses convolutional neural networks. Convolutional Neural Networks (CNN) is a type of feedforward neural networks with deep structure that includes convolutional calculations. It is one of the representative algorithms of deep learning. Convolutional neural networks have the ability to represent learning, and can perform translation-invariant classification of input information according to its hierarchical structure. For general large-scale image classification problems, convolutional neural networks can be used to build hierarchical classifiers, and can also be used to extract discriminative features of images in fine classification recognition for learning by other classifiers.

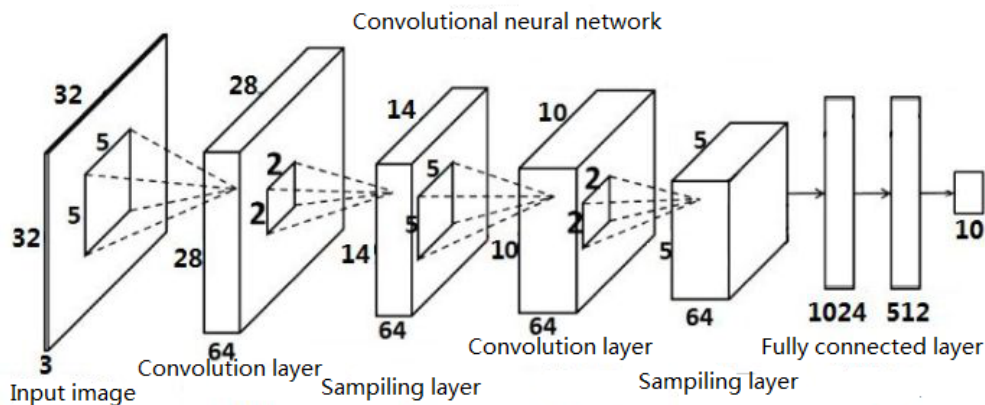


Figure 5 Convolutional neural network

CNN convolutional neural networks have become part of the most influential innovations in computer vision. Neural networks made their mark in 2012, with which Alex Krizhevsky won the ImageNet Challenge of that year. He reduced the classification error record from 26% to 15%, and a large number of companies began to use deep learning as the core of their services. Facebook uses neural networks for auto-tagging algorithms, Google uses it for image searches, Amazon uses it for product recommendations, Pinterest uses it for personalized homepage pushes, and Instagram uses it for search architecture.

#### 3.1 Cloud sharing analysis

Cloud database refers to a database that is optimized or deployed in a virtual computing environment, and can achieve the advantages of pay-as-you-go, scale-on-demand, high availability, and storage consolidation. According to the type of database, it is generally divided into relational database and non-relational database (NoSQL database).

The features of cloud database are: fast instance creation, support for read-only instances, read-write separation, automatic failover, data backup, Binlog backup, SQL audit, access whitelist, monitoring and message notification, etc. RDS, Redshif, and MongoDB are the mainstream cloud databases emerging in the market. Low price and high professionalism.

Alibaba Cloud Relational Database (RDS for short) is a stable, reliable, and elastic online database service. Based on Alibaba Cloud distributed file system and high-performance storage of

SSD disks, RDS supports MySQL, SQL Server, PostgreSQL, PPAS, and MariaDB TX engines, and provides a complete set of solutions for disaster recovery, backup, recovery, monitoring, and migration. Solve the troubles of database operation and maintenance.

Redshift implements a distributed database across a master node and multiple worker nodes. By using the AW management console, administrators can add or remove nodes from the cluster, and adjust the database size as needed. All data is stored in cluster nodes or machine instances. Redshift clusters can be implemented with two types of virtual machines: storage-intensive and compute-intensive. Storage-intensive virtual machines are optimized for large data warehouse applications, while compute-intensive provides more CPU for compute-intensive analytics applications.

Amazon Relational Database Service (RDS) is designed for transaction processing applications using SQL databases. Both scaling and basic management tasks can be automated using the AWS Management Console. AWS can perform many common database management tasks, such as backup.

#### **4. Summary**

This paper proposes a cloud-sharing defect monitoring system based on image processing technology. An industrial camera uploads product pictures to a computer. The computer uses image processing technology to collect and analyze texture images on the image surface to identify whether the product is defective or faulty. And accurately locate the scope of the defect and the type of the defect, and upload the defect to the cloud while performing a defect alarm. The production department, management department, quality inspection department and other clients exchange information through the display to timely and efficiently monitor the production of the product. Manage, continuously test and optimize the accuracy and safety of products, improve product quality, and have broad application prospects.

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