**1 Introduction**

**1.1Background**

In the process of scoliosis diagnosis/analysis, it is necessary to store a large amount of patient information and pictures of the spine. The traditional manual operation method is prone to data loss, statistical errors and slow speed. So we use ×××（MYSQL）database to store the relevant information (under discussion)  of patients and the path of each patient’s spine pictures stored in an chronological order to realize data sharing and centralized control. Hence, we finish the requirement analysis and divided requirements into 2/3/4 modules based on the discussion with team members and other teams. （我觉得有点像设计背景，但是没必要放在需求分析）

**1.2 System Purpose**

Design a relational database to complete patient information management. The framework and structure of the database are designed according to the equipment and operating status, which is convenient to provide powerful input, query, statistics, analysis and other functional operations to meet the basic requirements of the users.

**1.3 Reference**

《Beginning Database Design》

《Database design requirements analysis》

 这里应该还有client/algorithm那边的需求分析

**1.4 Hypothesis/Restrain**

This system mainly uses java/python as the back-end application development tool, MySQL as the back-end database and  Windows  as the system platform.

**1.5 Users**

我不太清楚病人可不可以查询 我就只写了医生

Only doctors and Diagnosis system users allowed.

Doctors are allowed to update, insert, delete and query data from the database.

Diagnosis system is only allowed to query data from the database.

（这算用户特点么 因为这个用户特点在那个格式里面是选写 不知道这么写可不可以）

功能需求

**2.1 Function description**

**2.1.1 Algorithm-oriented:**

The database should store all available labeled data for read and use during algorithm model training and iterative update.

The data results predicted by the algorithm should be reasonably stored in the database, including the relevant marked pictures, the maximum angle, the date of diagnosis, etc.

If there are experts or doctors to verify the results of the algorithm prediction in the later period, the results should be updated and fed back to the database to facilitate future improvements of the model.

**2.1.2 Client oriented:**

The user’s personal information should be reasonably stored, including name, gender, age, etc., and various views of the user’s spine should be stored effectively.

When the user uploads his own X-ray film, the analysis result of this X-ray film can be obtained

Users can obtain the trend of their spine angle over time and the suggestions of related experts and doctors through related queries.

**3.1. performance requirement**

**3.1.1. Accuracy**

Should make sure the accuracy of data and at the same time reduce the wasting of the storage space. According to the data we got, the image size is around 100KB, so use the mediumblob(can save 16MB data) is enough to store it. The data of bending angle is two decimal places ,so use a float is enough.

**3.1.2. Instantaneity**

Ensure that the response time is short enough when the number of users and the size of data increases, the response time should be limited within 1s.

**3.1.3. I\O**

The database's input and output are the same ,include patient's name, sex, age, bending angle and the X-ray film.

**3.2.Data management capability**

Able to process tens of millions of data.Can proceed the database create, the database optmizing, the database reorganization, the database security control, the report error problem analysis and summary, the report error problem processing , the database data daily backup opreations.

## 3.3. Security and confidentiality

### 3.3.1 Methods to prevent users from operating database directly

The key application server and database server are separated to prevent users from directly operating the database server and ensure the database security.

### 3.3.2 The user password of the application system is encrypted

In the software system, the data protection and business operation permission are completed by identifying the user's identity and authority. Compared with the user passord, if it is the same, the system will assign the user's operation authority to the user, and then the user will operate the system according to the assigned authority. To prevent the reveal of the uers password, in the process of transmission and the password record field in the database should not use plaintext transmission and storage, should use effective mainstream technology for the plaintext password before the password is transmitted, encrypt the transmission data with the encryption algorithm described in the encryption part, and transmit it to the system after encryption. The system compares the encrypted password data submitted by the user with the encrypted password saved by the user, and the subsequent operation will be carried out if they are consistent.

### 3.3.3 Identify and grade users' rights

In this application, Different businesses are handled by different people, and the data that can be accessed by different operators are different. In order to satisfy this requirement,

when the user logs in, the system obtains the user's permission after the user's authentication, and displays the corresponding function menu according to the user's permission. When the user browses the data after reading, writing and deleting, the system judges the user's access rights to the data and determines whether the operation is allowed.

## 3.4.Flexibility

### 3.4.1 Function flexibility

The database is designed for more requirements in the future. To meet these probable functions, the database need to adopt a scalable and modifiable method to develop. When some new requirements adding to the system, we don't have to rebuild the whole database, but just to add a few interfaces and instances to realize the functions.

### 3.4.2 Operation flexibility

The database system should be compatible with different kinds of operation modes, ranging from commen user to large-scale interface call. Different operation modes should be run properly in this databse system, and the system is enable to extend more available operation modes in the future.

## 3.5. Others

Environment support: the databse system should run properly in prevalent operation systems and software environments, such as Linux, Windows 7++, IOS, Android.

Interface Principle: the database system should provides some interfaces for convenient large amouts of data analysis. The interface principles should be designed appropriately.