软件项目计划书

项目名称：阅读理解问答系统

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# 1.Preface

## 1.1 Overview

As people's time fragmented increases, people desperately need something short and sharp to fill the gap. The popularity of short videos also confirms this. However, some people prefer to read books rather than watching videos, but do not have enough time to finish a book. This project uses machine reading comprehension to summarize the data entered by the user, so that the user can obtain the desired knowledge in the shortest time.

1.2 Project delivery products

Project plan, project introduction PPT, project source code, project test report

# 2. Product introduction

## 2.1 Introduction to project functions

### 2.1.1 Project core functionality

1. Realize the function of users uploading pictures and converting articles in pictures into text.

2. After entering the article, the system will understand and summarize the content in the article

3. When the user asks a question about the article, the system needs to answer the user's question according to the content of the article

### 2.1.2 Other features of the project

1. Realize the user's registration, login, modify the personal information module.

2. Diversify the mode of article upload, not limited to pictures. Users can upload the function by directly entering the content of the article.

3. The functions of article upload, system answer, user questions and other functions are realized in the front-end interface with a chat dialog box, and the user allows the system to judge what functions to perform by entering the password.

## 2.2 Technical Introduction

### 2.2.1 Summary extraction

Use textrank algorithm for summary extraction, TextRank algorithm is a graph-based sorting algorithm for keyword extraction and document summary, improved by Google's PageRank algorithm for web page importance ranking, which uses the co-occurrence information (semantics) between words in a document can extract keywords, it can extract the keywords, keyword groups of the text from a given text,and use the extractive automatic digest method to extract the key sentences of the text. The basic idea of the TextRank algorithm is to treat a document as a network of words, and the links in the network represent the semantic relationships between words.

Summary extraction is mainly divided into four parts: dividing the article into sentences, constructing a consistency matrix, calculating the importance weight score, and extracting the article in a summary according to the weight score

### 2.2.2 Machine reading comprehension

Huggingface's"Chinese\_pretrain\_mrc\_roberta\_wwm\_ext\_large" model is used for machine reading comprehension, first prepare the input data as the article and the question to be asked, secondly, encode the input, and input data into the model to get the answer, in which the model outputs the most likely answer, that is, the answer result.

The implementation of the machine reading comprehension function is mainly divided into three parts: loading the tokenizer and model, coding the input article and question awakening, and entering the data into the model to obtain the answer

### 2.2.3 Image to text function

The realization of the image to text function is divided into 9 parts: image preprocessing, binarization, tilt correction, layout analysis, character cutting, character recognition, layout recovery and post-processing and proofreading

# 3. Project planning

## 3.1 Project organization

|  |  |  |
| --- | --- | --- |
| member | role | task |
| Shi Zhouyin | Project Manager, Back-end Development Engineer,  Algorithm Engineer | Determine the task flow and ensure that the project is completed on time. Responsible for the development of back-end interfaces and the development of machine reading comprehension modules |
| Cai Shipeng | Front-end development engineer | Write graphical interfaces that make users feel simple and convenient, and ensure the correctness of data interfacing with back-end interfaces |
| Liu Haoyang | Algorithm Engineer | Responsible for developing images that can correctly recognize the user's incoming images into text and have a certain degree of fault tolerance |
| Xu Runxuan | Test Engineer | Responsible for testing front-end and back-end functional modules, and reporting test results. |

## 3.2 Project scheduling

The project is planned to start from week 5 and be divided into 10 weeks, of which two milestones will be set in week 10 and week 14, and a checkpoint will be achieved each week to complete different tasks. The project is planned to participate in the project for 2 hours/week per person

3.13-3.31 (weeks 5-7).

Specify the task plan, learn the required knowledge, set up the environment, and set up the database

4.3-4.7 (week 8).

Cai Shipeng: Write the landing page

Shi Zhouyin: Writing user registration, user information proofreading function, machine reading comprehension module

Liu Haoyang: Writing of image preprocessing and binarization functions

Xu Runxuan: Test each result

4.10-4.14 (week 9).

Cai Shipeng: Write a registration page

Shi Zhouyin: Writing user registration, user information proofreading function, machine reading comprehension module

Liu Haoyang: Writing of image preprocessing and binarization functions

Xu Runxuan: Test each result

4.17-4.21 (week 10, first milestone).

Shi Zhouyin: The docking of the front-end and back-end user login and registration functions, and the docking of the algorithm-end machine reading comprehension module and the back-end

Liu Haoyang: Writing of noise removal and tilt correction functions

Cai Shipeng: The docking of the front-end and back-end user login and registration functions, and the writing of the user's modification of personal information pages

Xu Runxuan: Test the running results

4.24-4.28 (week 1 1).

Shi Zhouyin: Modify the interface of user personal information, split sentences and word segmentation functions, and build the writing of collaborative matrix functions

Liu Haoyang: Layout analysis, character cutting, writing of character recognition modules

Cai Shipeng: Writing the interface between users and back-end interactive functions

Xu Runxuan: Test each result

5.1-5.5 (weeks 12).

Labor Day, a week off

5.8-5.12 (weeks 13).

Shi Zhouyin: The writing of the calculation weight score and summary extraction module, the docking between the algorithm end and the backend, and the docking between the back-end and the front-end page.

Liu Haoyang: Character recognition, layout restoration, post-processing proofreading function writing

Cai Shipeng: The docking of the back-end and the front-end

Xu Runxuan: Test the results

5.15-5.19 (weeks 14, second milestone).

Shi Zhouyin: The algorithm ends the connection between the picture to text module, the summary extraction module, the machine reading comprehension module, and the docking of each page in the front-end.

Liu Haoyang: The algorithm connects the image to text module with the back-end

Cai Shipeng: The docking of the back-end and the front-end

Xu Runxuan: Test the results

5.22-5.26 (weeks 15).

Optimize the system as a whole, test it, and view the results

5.29-5.31 (before Thursday of week 16).

Write a report speech and display PPT.