随着互联网产业的高速发展，每一个用户都期待得到更有针对性的个性化服务。所以，实现一个具有获取用户行为数据，并进行数据统计的模块，再用合适的可视化手段将数据展现出来的独立模块，将极大的提高一个网站的用户体验。这个模块可以方便网站的运营者利用相关的统计信息对网站的服务进行局部或者全面的优化。同时，也可以让具有相关权限的用户，通过统计数据去改变他们的工作模式，从而达到提高他们工作效率的结果。本文中所设计并实现的统计模块就是一个服务于教师端的统计模块，它是基于网站[www.oursparkspace.cn](http://www.oursparkspace.cn)，一个促进学生自学的项目自学式平台。目的在于帮助教师发现学生的学习模式，和学习规律，从而达到改进教学方式提升学生学习效率的目的。

**Introduction要求**

The *Introduction* is one of the most important parts of your report as it gives a brief overview that will make the reader understand (i) what you set out to do and (ii) what you achieved. Many readers will read the *Introduction* first and then the *Conclusions* to get an overview before reading the detail – so it is important that both sections are very carefully written.

It is very important that *Introduction* introduces the **report** and the **project** – it is not there to introduce the subject in general.

There are no rules on how to write an introduction, but it should include what the project is about, give *a very short description* of the technical context in which the project is carried out and explain the motivation for the work. If you are doing an implementation project it must explain what functionality the system **realises**, and if you are doing a research project what is the novelty of the approach used.

Very importantly, it should clearly indicate what you have done for the project.

A good introduction should be+ no more than 4 pages.

Motivation：

合理的数据分析能够直接的反应现有的工作状况，帮助用户从中发现问题，从而达到改进工作方式提升工作效率的目的。同时，合理的数据分析能够在一定程度上对未来的工作进行一个相对合理的预测，从而对一些不良的行为进行预警。然而，一切数据分析的基础就是具有一个合适的数据获取和数据统计的模块。有了相关的统计数据，才能对用户的行为做出合理的数据分析。本项目的实现是基于网站[www.oursparkspace.cn](http://www.oursparkspace.cn)的。这是一个促进学生自学的项目自学式平台。同时，它分为学生端和教师端两部分。教师们使用这个平台的有一个很重要的目的就是检验自身的教学模式是否有效，同时对学生的自学提供更加个性化的指导意见，从而达到提升他们学习效率。但是由于教师端的开发才刚刚起步，目前本网站缺乏一个位于教师端的数据获取和统计分析的模块。这就意味着，教师不能够直观的了解到目前学生的学习情况。所以，如果能够开发一个相应的数据获取和数据分析模块将极大的优化了教师端的用户体验。

Reasonable data analysis can directly reflect the current working conditions and help users find problems, so as to achieve the purpose of improving work methods and improving work efficiency. At the same time, reasonable data analysis can, to a certain extent, make a relatively reasonable prediction for future work, thus giving early warning to some bad behavior. However, the basis of all data analysis is to have a suitable module for data acquisition and data statistics. With relevant statistical data, reasonable data analysis can be performed on the user's behavior. The implementation of this project is based on the website www.oursparkspace.cn. This is a self-learning platform for students to self-study. At the same time, it is divided into two parts: student and teacher. A very important purpose for teachers to use this platform is to test whether their teaching model is effective, and to provide more personalized guidance to students' self-study, so as to improve their learning efficiency. However, due to the development of the teacher's side, it has only just begun. At present, this website lacks a module for data acquisition and statistical analysis on the teacher side. This means that teachers cannot intuitively understand the current student learning situation. Therefore, if you can develop a corresponding data acquisition and data analysis module will greatly optimize the teacher-side user experience.

Purpose：

结合在动机中所提到的，因为一个合理的数据分析统计模块将更好的服务于网站的运营者和维护者。同时，我目前的项目是基于网站[www.oursparkspace.cn](http://www.oursparkspace.cn)，并且这个网站目前缺少这么一个模块。因此，在教师端开发这么一个模块，第一是为了完善网站的用户体验，为运营者和使用者提供优化自己工作的基础。同时，这个模块也更直观的反应了学生的学习模式，学习规律和兴趣分布，使得教师端的用户可以利用这个模块总结自身的教学经验并改进自身的教学模式。更重要的是，教师可以利用这个模块反应的数据，对学生的学习进行更加个性化的指导，从而达到提升学习学习效率的目的。

As mentioned in the motivation, a reasonable data analysis and statistics module will better serve the website operators and maintainers. At the same time, my current project is based on the website www.oursparkspace.cn, and this site currently lacks such a module. Therefore, to develop such a module on the teacher's side, the first is to improve the user experience of the website and provide operators and users with the basis for optimizing their work. At the same time, this module also more intuitively reflects the student's learning mode, learning rules and interest distribution, so that the teacher-end users can use this module to sum up their own teaching experience and improve their own teaching mode. More importantly, teachers can use the data of this module response to provide more personalized guidance to students' learning, so as to achieve the purpose of improving learning and learning efficiency.

Technical context：

我的整个项目分为了两部分，一个是设计一个是实现。这两部分分别用到了不同的工具和技术。设计部分，不具备太多的技术内容，我主要用了Axure原型工具，一款具有可视化工作环境的专业的快速原型设计工具完整了我对整个模块的设计。

实现部分，我的成品是完成一个现有的网站的一个新的模块的开发。由于网站之前是基于wordpress、且主要运用php语言。所以，我的新模块的开发也是基于wordpress，并且主要采用php语言结合sql语言、html语言、css、和JavaScript·以及jQuery·框架。

其中后端部分主要运用了php语言进行了对参数的处理与传递和各种数据格式的转换，以及结合sql语言对数据库数据进行了操作。前端部分主要运用了html语言、css、结合JavaScript、jQuery框架和php语言动态的生成前端网页。

My entire project is divided into two parts, one is to design one is to achieve. Both parts use different tools and techniques. In the design part, I don't have much technical content. I mainly use the Axure prototype tool. A professional rapid prototyping tool with a visual working environment completes my design of the entire module.

In the implementation section, my finished product is a new module for the development of an existing website. Since the website was previously based on the wordpress framework, it mainly uses the php language. Therefore, the development of my new module is also based on the wordpress framework, and mainly uses php language combined with sql language, html language, css, and javascript and jQuery framework.

My new module is also divided into front-end and back-end parts. The back-end part mainly uses the php language to process and transfer parameters and convert various data formats, and it also uses sql language to operate on database data. The front-end part mainly uses html language, css, combined with JavaScript, jQuery framework and php language to generate front-end web pages.

Achievement：

我的整个项目主要可以分为三个主要的任务。在第一个主要任务中，我需要完成的是调研相关的用户需求，以及学习相关的设计软件axure和wordpress、php语言等学习任务。其中调研用户需求具体指的是，我要实现的教师端数据获取统计模块应该分为哪几个部分，并且每一部分应该要获取统计哪一类的数据。第一个主要任务我已经在第一阶段按照要求完成了，调研过后我把项目分成了三个大的部分，主要为了获取和统计学生用户的兴趣分布以及学习行为。

第二个主要任务便是设计出相应的数据获取及统计模块的原型了。由于有了第一个任务的调研基础，在第二个任务中，我把项目模块分为了三个主要部分，第一部分负责获取统计了学生用户的浏览和搜索行为。第二个部分是整个小组及小组个人的学习轨迹做了一个大致的记录。第三部分，针对平台的另一个模块，项目模块进行了专门的统计。目的是为了研究小组学生的兴趣分布情况。同时，项目用axure原型工具，完成了整个原型的设计。整个原型的设计包含了每一个部分应该需要获取并统计的相关数据内容，以及各个页面的大致前端样式，同时还包含了各个页面的逻辑跳转关系等。第二个任务，我已在项目中期按照要求完成了整个的原型设计。

第三个部分便是实现在第二部分中所设计的项目原型了。由于在之前的工作中，我已经把整个项目的逻辑关系，以及需要获取和统计的数据做了一个很好的梳理及设计，所以在实现过程过进展顺利。最后实现的项目与我在之前设计的原型大体一直。但是，由于后期对项目的的观念有了部分改变，所以我在数据可视化的部分做了部分的改动，其余部分按照之前的设计及项目要求完成。

My entire project can be divided into three major tasks. In the first major task, what I need to complete is to investigate relevant user requirements, as well as learn the related design software axure and wordpress framework php language and other learning tasks. The investigation of user requirements specifically refers to the parts of the teacher-side data acquisition and statistics module that I want to implement, and each section should obtain statistics on which type of data. The first major task I have completed in the first phase as required. After the investigation, I divided the project into three major sections, mainly to obtain and count the distribution of student users' interest and learning behavior.

The second major task is to design a prototype of the corresponding data acquisition and statistics module. Because of the research basis of the first task, in the second task, I divided the project module into three major parts. The first part is responsible for obtaining statistics on the browsing and searching behaviors of student users. The second part is a rough record of the learning trajectory of the entire group and the group. In the third part, the project module carries out special statistics for another module of the platform. The purpose is to study the distribution of interest of group students. At the same time, the project completed the design of the prototype with the axure prototype tool. The design of the entire prototype includes the relevant data content that each part should need to acquire and count, as well as the general front-end style of each page, and also includes the logical transition relationship of each page. For the second task, I completed the entire prototype design as required during the middle of the project.

The third part is to implement the project prototype designed in the second part. In the previous work, I have made a good combing and design of the logical relationship of the entire project, and the data that needs to be acquired and counted. Therefore, the implementation process has progressed smoothly. The final implementation of the project was largely consistent with the prototypes I had previously designed. However, due to partial changes to the concept of the project in the later period, I made some changes in the data visualization part, and the rest was completed according to the previous design and project requirements.

Report structure:

Abstract part. It’s aiming at introducing the purpose of the project and giving a brief description of the implement of my system.

Introduction part. It shows the motivation and purpose to do this project. It also concludes the technical context of this project which introduces the related technologies of this project. And it shows the setting goals of this project and what I have done to now.

Background part. It describes the relevant background of this project. It gives a brief introduction to the target website – sparkspace, and related technologies and related tools of this project.

Design and implementation part. It’s the core part of my report. It includes the prototype design for this project, the requirement analysis, and the implementation of this project.

Result and discussions part. This part shows the screenshot of this project and the tested results after testing this project.

Conclusion and further work part. This part will give a whole result of my final project and

give some parts that can be extended in the future.

**Background 要求：**

In this part of the report, you should give all the relevant background information about your project. Remember that your reader will not necessarily know the background technology you are using, so it is worthwhile to let them know.

Also if your project is a research project, this is a good place to put down the related work or state of the art in the area – what the others have done? And why your research is novel?

But don’t make the background 20 pages long with every detail. It should be relevant to your project, with all the necessary information, written nicely and crisply.

火花空间：

由于我的项目的设计风格和实际应用都是为了服务网站火花空间[www.oursparkspace.cn](http://www.oursparkspace.cn)的，并且这个名词在前文也出现了多次。所以，在这里对其进行一个系统的介绍是很有必要的。

火花空间是一个旨在尽快帮助大一新生建立工程认知的项目自学式平台。在这个平台上，主要有几个大的模块，都是为了方便大一新生们进行自学而开发的。由于之前此网站的服务对象还是以北京邮电大学信息与通信工程学院大一新生为主的，所以各个模块的内容都比较具有专业性和针对性。

第一个重要的模块是wiki模块，它里面包含了很多的词条，主要针对的是新生的一些课程的相关内容，为了帮助新生进行理解性的自主学习。第二个模块是问答模块。这个模块有两个重要的作用，第一个是提供一个帮助大一新生解决问题的途径。第二个是帮助大一新生们培养这种协作学习的学习方式，希望以此达到提升他们学习效率的目的。第三个重要的模块叫做项目。这个模块中提供了很多优秀学生自己做的实验的教程关于整个实验流程及细节。也有平台自主筛选的优秀教程，目的是帮助学生们通过自学去完成一个个小的项目。最后一个重要的模块是群组模块，这个模块不提供任何学习内容。主要是用于提供一个辅助管理以此达到提升学生学习效率的方式，教师通过建立群组，把参与课程的学生拉近一个群中，然后可以定期发布任务，督促学生学习监督学习进度。

我所开发的数据获取和统计模块也位于这个群组的模块中，目的就是为了方便教师们对自己课程中的学生的学习效果有一个更加直观的了解。以便于方便教师们对自身课程进行改进，同时可以为群组中的学生提供更加有针对性的教学指导，从而达到提升学生自学效率的目的。

Because my project's design style and practical application are all to serve the website SparkSpace that www.oursparkspace.cn, and this website has appeared many times in the previous article. Therefore, it is necessary to do an introduction for this website here.

SparksSpace is a project self-study platform designed to help freshmen build engineering awareness as quickly as possible. On this platform, there are mainly several large modules that are all developed to facilitate the freshmen's self-study. As the mainly service object of this website is still based on the freshman of the School of Information and Communication Engineering of Beijing University of Posts and Telecommunications, the content of each module is more professional and pertinent for the students in this major.

The first important module is the wiki module, which contains a lot of entries, mainly for the relevant content of some freshmen's courses, in order to help freshmen understand autonomous learning. The second module is the question and answer module. This module has two important roles. The first one is to provide a way to help freshmen solve problems. The second is to help freshmen develop this collaborative learning approach, hoping to improve their learning efficiency. The third important module is called the project. This module provides many tutorials of the process and details of some projects which were finished by the outstanding students. There are also excellent tutorials for platform self-selection. The purpose is to help students learn how to complete a small project by self-study. The last important module is the group module, which does not provide any learning content. It is mainly used to provide an auxiliary management to improve students' learning efficiency. Teachers establish groups to bring students involved in a course closer to one group. Then they can regularly publish tasks to urge students to learn and supervise their progress.

The data acquisition and statistics module that I developed is also located in the module of this group. The purpose is to facilitate the teachers to have a more intuitive understanding of the learning effect of the students in their own curriculum. In order to facilitate teachers to improve their own curriculum, they can provide more targeted teaching guidance for students in the group, so as to achieve the purpose of improving student self-learning efficiency.

项目中的用户行为

由于本项目的目的就是为了获取和统计基于网站[www.oursparkspace.cn](http://www.oursparkspace.cn)中的用户行为。所以，对于项目中所指代的用户行为进行一个介绍。

用户在网站中的能够产生并被获取和统计的用户行为是有限的。基本上，能够获取的用户行为有，用户的浏览记录、浏览时间、浏览的文章内容、浏览的文章类型以及用户的进行的搜索内容。所以，本项目所获取和统计的数据所指的就是以上所列举的用户行为。但其目的是为了揭示更深层次的用户行为的。

虽然可以统计的数据类型有限。但是，通过一定的分析，还是可以发现一定的隐藏规律和更深层次的用户行为的。比如，通过统计群组中所有成员的浏览记录和浏览内容，可以大致统计出群组成员的学习的积极性和了解群组成员是否有跟上课程的进度。还可以通过统计群组成员的学习内容结合相应的学习阶段，可以对群组的学习轨迹有一个简单的绘制。另外，对于学习内容和学习频次的统计，还可以对群组成员的学习兴趣分布有一个直观的可视化呈现。以上的用户行为都是结合可以统计的显性用户行为后，经过简单的数据分析可以很直观的表现出的，更深层次的用户行为。

Since the purpose of this project is to obtain and count user behavior based on the website www.oursparkspace.cn. Therefore, an introduction is made to the user behavior indicated in the project.

The user's behavior on the website that can be generated and acquired and counted is limited. Basically, the user behaviors that can be obtained include the user's browsing history, browsing time, browsed article content, browsed article type, and user's searched content. Therefore, the data obtained and counted in this project refers to the data listed above.

Although there are limited data types that can be counted. However, through certain analysis, we can still find certain hidden rules and deeper user behavior. For example, by counting the browsing records and browsing contents of all the members in the group, you can roughly count the enthusiasm of the group members for learning and understand whether the group members have followed the progress of the course. It is also possible to have a simple drawing of the learning trajectory of the group by counting the learning contents of the group members in combination with the corresponding learning stage. In addition, for the statistics of learning content and learning frequency, an intuitive visualization of the distribution of learning interests of group members can also be presented. The above user behaviors are combined with statistically explicit user behaviors. After simple data analysis, the user behaviors can be expressed more intuitively and deeper.

Wordpress：

WordPress is a blog platform developed by the PHP language, users can utilize the webserver

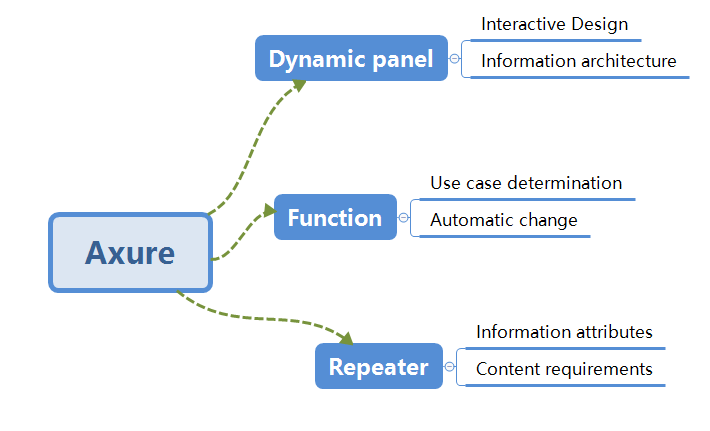
which supports PHP and MySQL database to set up their own website. WordPress can also be used as a content management system (CMS).

WordPress is a personal blog system, and gradually is evolved into a content management system software, which is developed using PHP language and MySQL database. users can utilize the webserver which supports PHP and MySQL database to set up their own blog.

Why I choose to use Wordpress is because that this project is based on the website SparkSpace which has been introduced previously. And this website used the Wordpress, so I also choose to use Wordpress.

Axure

Axure RP是一个专业的快速原型设计工具。它让负责定义需求和规格、设计功能和界面的使用者能够快速创建应用软件或Web网站的线框图、流程图、原型和规格说明文档。作为专业的原型设计工具，它能快速、高效的创建原型，同时支持多人协作设计和版本控制管理。



之所以选用Axure进行原型开发是因为，第一它拥有好的动态面板，可以有效的帮助梳理项目的页面结构。第二是因为，它拥有很强大的函数库。可以模拟很多的逻辑判断以及参数传递，帮助我梳理我的项目细节。第三，它的中继器可以帮助我对将要获取和统计的数据进行一个更好的梳理，方便我之后的模块开发时有一个清晰的逻辑。

Bootstrap:

在前端开发的时候我部分使用了前端框架bootstrap。之所以选用Bootstrap框架，是考虑到了Bootstrap是基于 HTML、CSS、JavaScript ，同时使用的时候它十分的灵活简便，有许多的包可以直接导入使用，便于我的前端开发。在我的前端开发中，我直接使用了它的部分组件以及jQuery插件增强我的页面动态效果。

Echarts

数据可视化在我的项目中是一个重要的部分。它是这个数据获取和统计模块最直观的展示部分。为了更好的展现这一部分数据可视化的内容，我结合使用了echarts插件来完成这个项目的数据可视化部分。

ECharts，是一个使用 JavaScript 实现的开源可视化库，可以流畅的运行在 PC 和移动设备上，兼容当前绝大部分浏览器（IE8/9/10/11，Chrome，Firefox，Safari等），底层依赖轻量级的矢量图形库 [ZRender](https://github.com/ecomfe/zrender" \t "_blank)，提供直观，交互丰富，可高度个性化定制的数据可视化图表。

同时它还具有丰富的可视化类型。ECharts 提供了常规的[折线图](http://echarts.baidu.com/option.html" \l "series-line" \t "_blank)、[柱状图](http://echarts.baidu.com/option.html#series-line)、[散点图](http://echarts.baidu.com/option.html#series-scatter)、[饼图](http://echarts.baidu.com/option.html#series-pie)、[K线图](http://echarts.baidu.com/option.html#series-candlestick)，用于统计的[盒形图](http://echarts.baidu.com/option.html#series-boxplot)，用于地理数据可视化的[地图](http://echarts.baidu.com/option.html#series-map)、[热力图](http://echarts.baidu.com/option.html#series-heatmap)、[线图](http://echarts.baidu.com/option.html#series-lines)，用于关系数据可视化的[关系图](http://echarts.baidu.com/option.html#series-graph)、[treemap](http://echarts.baidu.com/option.html#series-treemap)、[旭日图](http://echarts.baidu.com/option.html" \l "series-sunburst)，多维数据可视化的[平行坐标](http://echarts.baidu.com/option.html#series-parallel)，还有用于 BI 的[漏斗图](http://echarts.baidu.com/option.html" \l "series-funnel" \t "_blank)，[仪表盘](http://echarts.baidu.com/option.html#series-gauge)，并且支持图与图之间的混搭。

Design and implementation

Normally there will be a part about the design and implementation of the system, especially for an implementation project. However, every project has its unique phases so you should talk to your supervisor about it.

需求分析：

一个综合的分析，将对项目的设计和实现有着更加良好的规划。并且，对于本项目的前期调研也是我的其中一个主要任务。所以，在这个部分我先阐述一下我对于这个项目的需求分析。

结合之前的背景介绍，我们知道了，本项目的主要服务对象就是使用平台的教师们。并且，在调研之后我发现了，平台中的教师主要分为两个大类的教师。第一个类别是，教授一门专业的课程，课程涉及学科内容比较专业并且局限于这个专业之中。第二个类别是，开展创新创业课程这类活动课程，课程涉及学科内容广泛具有很多跨专业结合的情况。对于这两个大的类别的教师来说，他们希望获取和统计的学生的信息是很不一样的。因此，我把这个两个类别分开进行了需求分析。

对于第一类教授单一专业课程的老师，在调研之后我发现，他们更多的是会关注学生们的学习进度是否能够跟上授课的内容。同时，他们也会希望了解一个成绩好的学生和一个成绩差的学生在学习轨迹上有什么不同的地方，从而通过交叉对比来进一步的优化自己的教学模式。对于第二类开展创新创业活动的老师来说，这一类的老师可能就并不会太关注学生们在某一类学科上是否具备很强的专业性，他们更多的关注的是学生们的创意和实践情况。所以，这类老师可能更多的关注学生的兴趣点分布，整个组的创新创业点都分布在哪一些方向上。从而对不同的学生提供不同的个性化的指导，帮助学生们完成自己的创新创业产品。以上就是我结合实际情况进行的需求分析。

A comprehensive analysis will have a better plan for the design and implementation of the project. Moreover, the preliminary investigation of this project is also one of my major tasks. Therefore, in this chapter I will first elaborate on my needs analysis of this project.

Combined with the background introduction before, we know that the main service target of this project is to use the teachers of the platform. And, after research, I discovered that the teachers in the platform are mainly divided into two broad categories of teachers. The first category is to teach a professional course. The course involves a more professional subject and is limited to this subject. The second category is that of conducting activities such as innovative entrepreneurship courses that involve a wide range of cross-professional integration of subject content. For these two large categories of teachers, the information they want to obtain and count is very different. Therefore, I separated the two categories for a needs analysis.

For the first category of teachers who teach a single major course, I discovered after the survey that they are more concerned about whether the students’ learning progress can keep up with the content of the lectures. At the same time, they will also want to understand the differences in the learning trajectory between a good student and a poor student, so that they can further optimize their own teaching mode through cross-reference. For the second category of teachers who conduct innovative entrepreneurial activities, this type of teacher may not be too concerned about whether the students have a strong degree of specialization in a certain discipline. They pay more attention to the students. Creative and practical situation. Therefore, such teachers may pay more attention to the distribution of students' interest points, and in which direction the entire group of innovation and entrepreneurship points are located. In order to provide different students with different personalized guidance to help students complete their own innovative and entrepreneurial products. The above is a demand analysis that I conducted in light of the actual situation.

Design

结合之前的需求分析，为了能够满足两类主要的教师用户的需求。最后，我把这个模块的获取和统计数据分为了三个部分。第一个部分，叫做词条频度。其统计的内容是，整个群组中的用户对于网站中的所有词条的浏览和搜索情况。这一部分的主要目的在于方便教师们了解学生的学习积极性，以及他们的学习内容是否符合当前的教学进度。同时，这一部分也部分反应了学生的学习兴趣点的分布。

In combination with previous requirements analysis, in order to be able to meet the needs of the two main types of teacher users. Finally, I divided the acquisition and statistics of this module into three parts. The first part is called the frequency of entries. The statistical content is that the users in the entire group browse and search all the terms in the website. The main purpose of this section is to make it easier for teachers to understand students' enthusiasm for learning and whether their learning content is in line with the current teaching progress. At the same time, this part also partially reflects the distribution of students' interest in learning.

（配图）：

第二个部分叫做行为轨迹，这个部分主要对于整个群组中的所有用户的学习轨迹，和参与问答的行为进行了一个统计。所谓的学习轨迹，它主要统计的内容就是群组的同学们在一段时间内是从某一个知识点转移到下一个知识点所形成的轨迹图像。并且，这一部分分成了整组的行为轨迹和个人的行为轨迹。通过交叉对比个人的行为轨迹，可以方便教师们发现成绩好的学生和成绩差的学生，在学习轨迹上的不同。从而发现一条更加具有优势的教学路径，以此达到优化教学内容的目的。

The second part is called behavioral trajectory. This part mainly includes statistics on the learning trajectory of all users in the entire group and the behaviors involved in question and answer. The so-called learning trajectory, its main statistical content is the group of students in a period of time is transferred from a knowledge point to the next point of knowledge formed by the trajectory image. And, this part is divided into the whole set of behavioral trajectories and individual behavior trajectories. By cross-referencing the individual's behavior trajectory, teachers can find that the students with good grades and poor grades have different learning trajectories. In order to find a more advantageous teaching path, the purpose of optimizing teaching content is achieved.

（配图）

而对于群组同学参与问答的统计，目的是在于发现同学们在学习中所遇到的问题。同时，通过学生的提问和回答，可以发现他们对面某一阶段或者某一部分的知识点的掌握情况。并且，对于问题参与的次数的统计可以反应同学们学习的积极性，以便于教师对自己阶段性的教学任务有一个直观的了解。

For the group students to participate in the question and answer statistics, the purpose is to discover the problems encountered by the students in their studies. At the same time, through the students' questions and answers, they can find out the situation of their knowledge of a certain stage or a certain part of the opposite side. Moreover, the statistics on the number of questions involved can reflect the enthusiasm of the students to learn, so that teachers have an intuitive understanding of their staged teaching tasks.

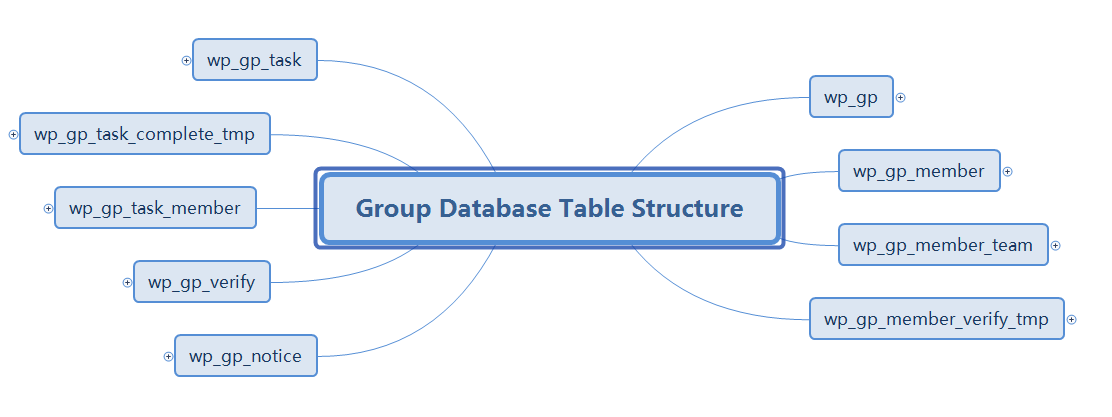
（配图）

第三个部分叫做兴趣分布。这一部分是很有针对性的只统计了网站中的项目模块的浏览记录。因为项目模块是整个Sparkspace网站中最重要的模块，它是辅助学生们进行实践自学的基础，并且它包含了很多类别的项目内容。所以，对这一部分的专门的统计，可以反映出学生们的兴趣分布，特别是第二类开展创新创业课程的老师，可以通过这一部分获得很直观关于学生兴趣分布的反馈信息。

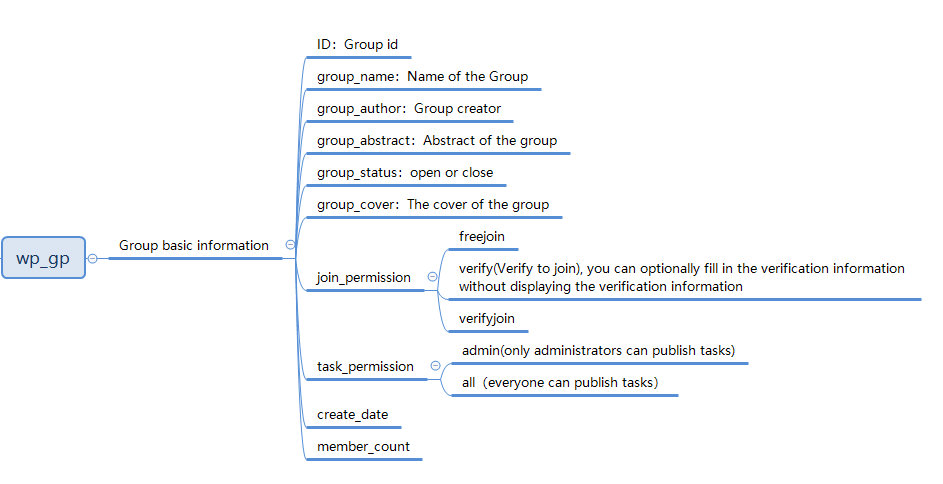
The third part is called interest distribution. This part is very specific and only records the browsing records of the project modules in the website. Because the project module is the most important module in the entire Sparkspace website, it is the basis for assisting students to practice self-study, and it contains many categories of project content. Therefore, the special statistics of this part can reflect the distribution of students' interests, especially the second category of teachers who carry out innovative entrepreneurship courses. Through this part, it is possible to obtain feedback information that is very intuitive about the distribution of students' interests.

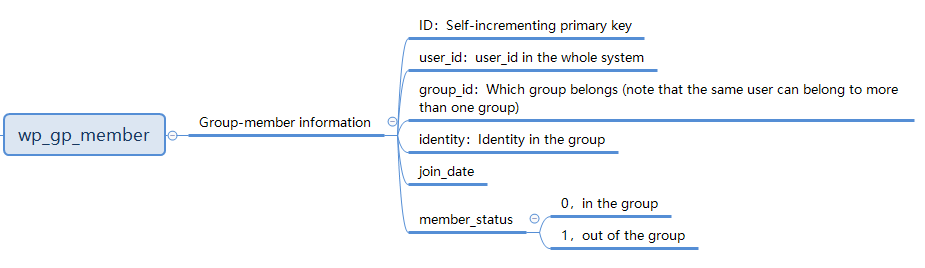
Database table design:

对于数据获取和数据统计来说，设计一个合适的数据库的结构都是很重要的。因为Wordpress有自己的数据库，并且具有一定的结构关系，所以之前Sparkspace已经能够统计很多的用户行为了。但是，我的大部分数据获取和数据统计工作都是针对群组成员的。同时，群组部分的内容和我项目是同时进行开发的。所以，我也参与的群组部分的表结构的设计。下图就是群组部分的表结构设计：



其中具体的两张由我设计且在我的项目中用于筛选群组成员和储存成员数据的表单为：





正如之前内容获取的设计中所说的一样，我把整个模块分成了三个部分。所以我的整个模块也是分成了这三个部分来实现的。

词条频度：

关于整个词条频度部分。按照之前的设计内容，它所统计的是整个群组中的学生用户的浏览和搜索的内容。所以，在这一部分，我选择用一个复合折线图来反应学生用户浏览的内容，以及浏览内容的趋势变化。同时，我也选择用了饼状图，来反应用户浏览各个内容所占所有浏览内容的比例。之所以选用饼状图，是因为饼状图能够直观的反应比例之间的关系。同时，用户还是选择开始和结束时间来查看一个时间段内的数据情况。整个页面实际效果如下：

行为轨迹：

在学习轨迹部分，结合实际需求的考虑，我自己创造了一种统计学习轨迹的模式。即统计每天所有词条被点击的次数，然后取被点击次数最高的一个词条为路径上的一点。如果有一天整个群组的学生用户都没有产生学习行为的话，这个空的节点会被去除。最终这个统计结果会形成一条路径，也就这一个部分的学习路径的实现方法。并且，用户还可以选择开始和结束时间来查看一个特定时间段内的学习轨迹的变化情况

这个部分我统计的是小组成员参与的所有问答部分中的问题。不论小组成员是发起提问，或者帮助回答都会被记录下来。然后，所有的参与内容都会被记录下来。通过筛选和统计，最后都被罗列出来。其中参与的次数反应了学生用户们现阶段的学习的重难点，最后浏览时间反应了问题的重要程度。

In this section, I counted the questions in all Q&A model that the team members participated in. Regardless of whether the group members initiate questions or help answers will be recorded. Then, all the participating content will be recorded. Through screening and statistics, they are all listed at the end. The frequency of participation reflects the difficulty of student students' learning at this stage. The last browsing time reflects the importance of the problem. The whole section just looks like the following figure:

兴趣分布：

兴趣分布是这个模块的最后一部分了。它专门的统计了Sparkspace网站中项目模块中的内容被浏览的次数，因为项目模块是整个网站中最重要的一个模块了，所以它被进行了独立的统计。其目的是在于反应整个群组内的学生用户们的兴趣的变化情况和一个兴趣的分布情况。在这一部分，我还是选用了复合折线图和饼状图来完成数据可视化的部分。因为，我认为这两个图可以很好的反应一个趋势的变化，和内容所占的比重。能够在视觉上直挂的给教师们进行数据反馈。

Interest distribution is the last part of this module. It specifically counts the number of times the content of the project module in the Sparkspace site was browsed, because the project module is the most important module in the entire site, so it was independently counted. The purpose is to reflect the changes in the interests of student users in the entire group and the distribution of one interest. In this section, I chose to use a composite line chart and a pie chart to complete the data visualization. Because, I think these two diagrams can reflect the change of a trend and the proportion of content. Data feedback can be provided to teachers visually.

后端实现部分：

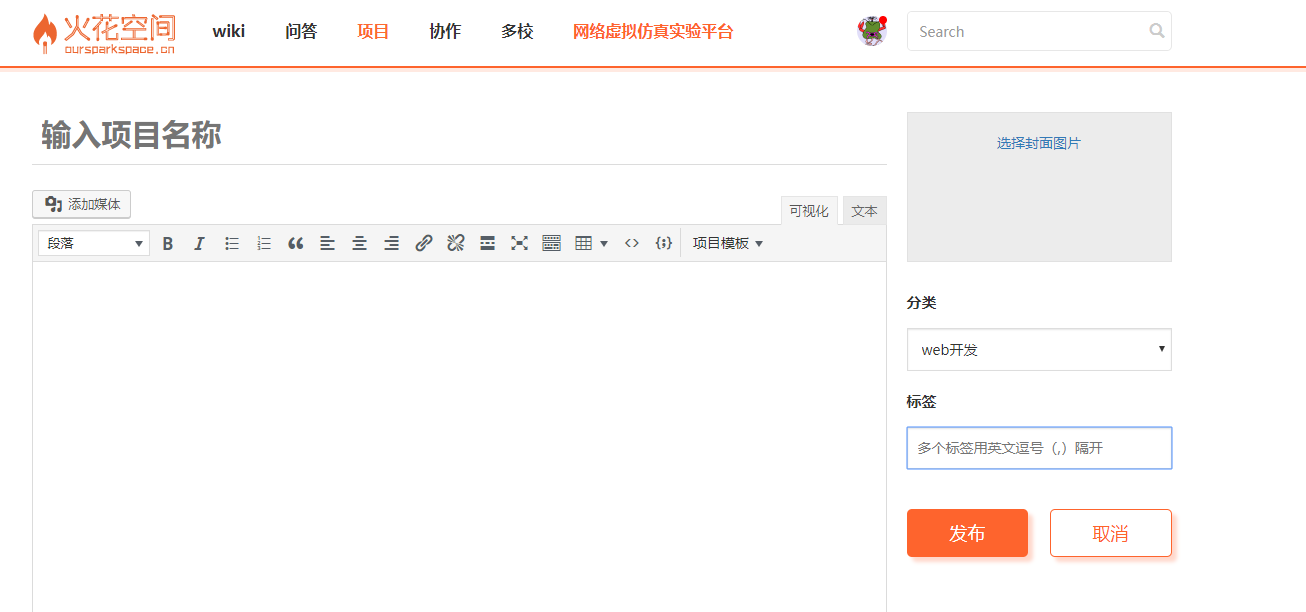
1. 数据获取

实现这个模块的第一步，就是需要获取相关的需要统计的数据。根据之前的分析，对于整个模块需要统计的信息来说，我们可以把需要获取的数据分为三类。第一类是用户的浏览行为，第二类是用户参与问答界面中对于问题的提问和回答行为。第三类是用户对于项目部分中具体的实验的学习行为。

The first step in implementing this module is to obtain relevant data that need statistics. According to the previous analysis, we can classify the data that needs to be obtained into three categories for the entire module. The first category is the user's browsing behavior, and the second category is the user's participation in the Q&A interface for questioning and answering questions. The third category is the user's learning behavior for specific experiments in the program section.

其中，对于第三类项目部分的学习行为来说，由于每个项目创建的时候都需要创建项目的用户手动打上标签，这些标签都会被直接关联并且被记录到数据库中。并且，用户从项目部分进入再创建文章的时候在Wordpress自动创建的表单wp\_term\_taxonomy中会被直接记录taxonomy为post\_tag.

Among them, for the learning behavior of the third type of part of the program, since the user who needs to create the program is manually tagged when each program is created, these tags are directly linked and recorded in the database. And when user create the new program from the program part, the attribute will be record as post\_tag in the table that wp\_term\_taxonomy.



对于第一类的用户的浏览行为，和第二类的用户参与问答界面中对于问题的提问和回答行为，就需要运用到数据埋点再写入数据库的方法来获取和存储数据了。具体的实现方法主要运用到了session 和 cookie的设置。在每个新的页面被打开的时候，我会在页面的头部重新开始加载一个新的session. 这个session会根据当前cookie里的值，更新相应的属性值，再把相应的属性值写入数据库。具体的实现方法如下。

For the browsing behavior of the first type of users, and the second type of user's participation in question and answer questions in the question and answer interface, it is necessary to use a method of data embedding and then writing to the database to acquire and store data. The specific implementation method is mainly applied to the session and cookie settings. When each new page is opened, I will restart the loading of a new session at the head of the page. This session will update the corresponding attribute value according to the current cookie value and write the corresponding attribute value into database. The specific implementation is as follows.



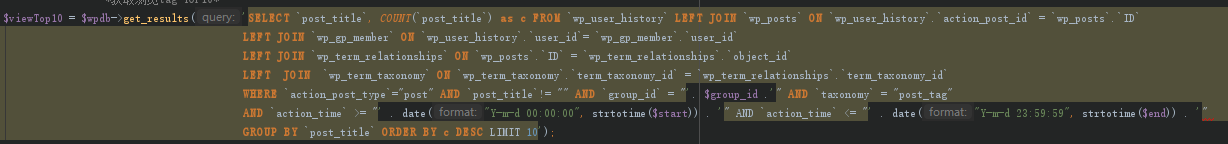
第一行代码是启动一个新的session在每个新页面被加载了之后。第二行代码用来记录当前的post\_id. 它先做了一个判断，判断之前的cookie是否有在记录一个post\_id，post\_id没有被设置过的话，将会被更新为目前的page\_id.之后的代码也是做的类似的记录，分别记录了post\_type、user\_id。其中action的默认行为就是browse，也是我要记录的第一类的用户行为.当用户产生别的用户行为是，cookie内的action会被修改，在页面被重新加载的时候会被重新记录进数据库。目前，我的数据埋点主要是针对问答环节，在问答界面中，当用户完成提问或回答之后点击了提交按钮，cookie内的action对应的内容就会被改，同时页面会被重新加载，session被重新启动记录下之前的用户行为。当加载的session内的内容都被设置完成之后，将会调用writeUserTrack（）方法把存储与session中的信息都写入到表单user\_history中。然后针对第一类和第二类数据的获取就已经全部完成了。

The first line of code starts a new session after each new page is loaded. The second line of code is used to record the current post\_id. It first makes a judgment, determines whether the previous cookie has a post\_id in the record, and if the post\_id is not set, it will be updated to the current page\_id. The code after this is also done similar records, respectively record the post\_type, user\_id. The default behavior of the action is browse, which is the first type of user behavior I want to record. When the user generates another user behavior, the action in the cookie will be modified and will be re-recorded into the database when the page is reloaded. Currently, my data is mainly focused on questions and answers. In the Q&A interface, when the user clicks on the submit button after completing a question or answer, the corresponding content of the action in the cookie will be changed and the page will be reloaded. It was restarted to record the previous user behavior. After the contents of the loaded session have been set, the writeUserTrack() method will be called to write the information in the storage and session to the form user\_history. Then the acquisition of the first and second types of data has already been completed.

1. 获取合适的数据

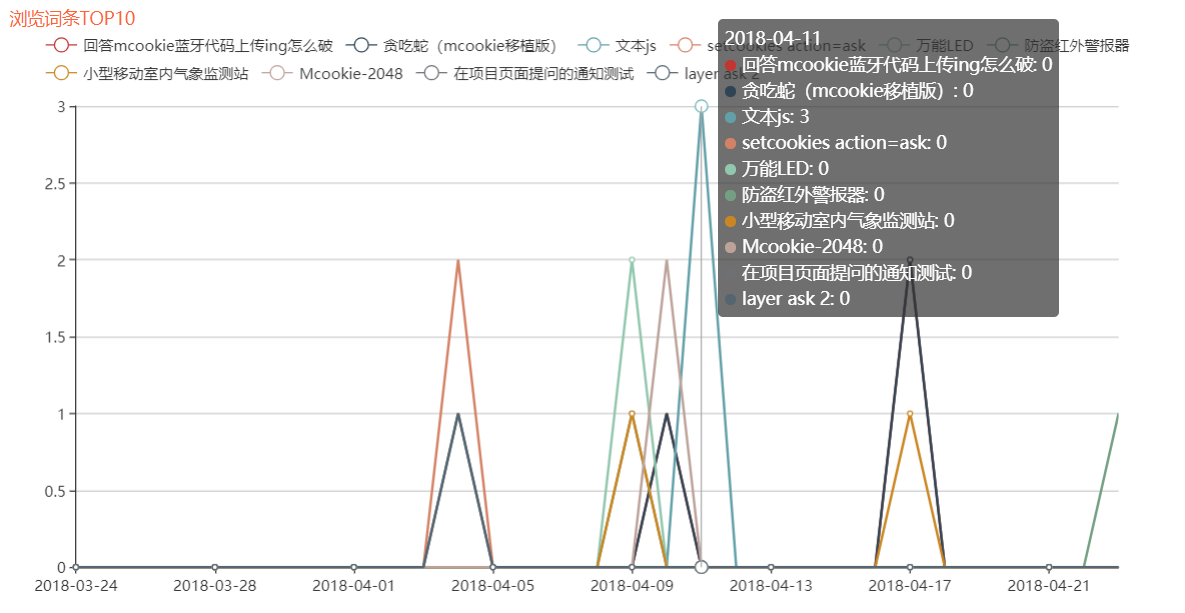
获取合适的数据是我这个项目的第一步。由于Wordpress的数据库构建属于关系型数据库，所以很多需要用到的数据并不是储存在同一张表中。并且，很多时候需要通过连接别的表单来给需要获取的数据增加约束条件。因此，我们需要采用合适的连接关系，连接多张表单，并且设置合适的约束条件，从而筛选出需要用到的数据。以项目中浏览项目TOP10数据的筛选为例，它需要关联5张表，然后再合理的设置约束条件，才能选出合适的数据。

Getting the right data is the first step of my project. Since Wordpress' database construction is a relational database, many data needs to be used are not stored in the same table. And, in many cases, you need to add constraints to the data you need to obtain by linking other forms. Therefore, we need to use appropriate connection relationships, connect multiple sheets, and set the appropriate constraints to filter out the data that needs to be used. Taking the screening of the program TOP10 data in the project as an example, it needs to correlate 5 tables, and then set reasonable constraints to select the appropriate data.

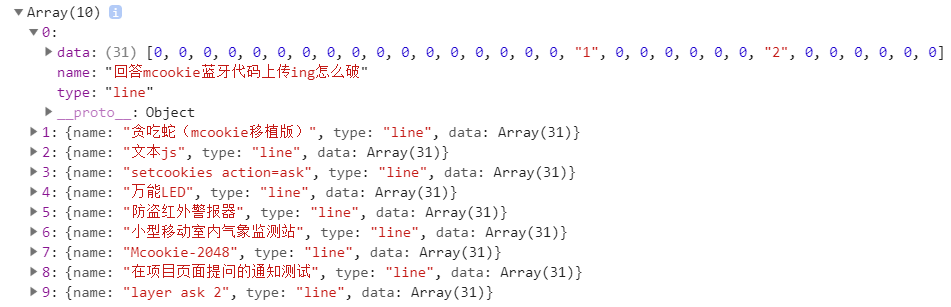


转变数据结构：

在获取了相应的数据之后，我们需要再对获取的数据类型和结构进行转换之后才能使用数据，因为需要用的数据都有特定的格式要求。我们以项目中的复合折线图为例

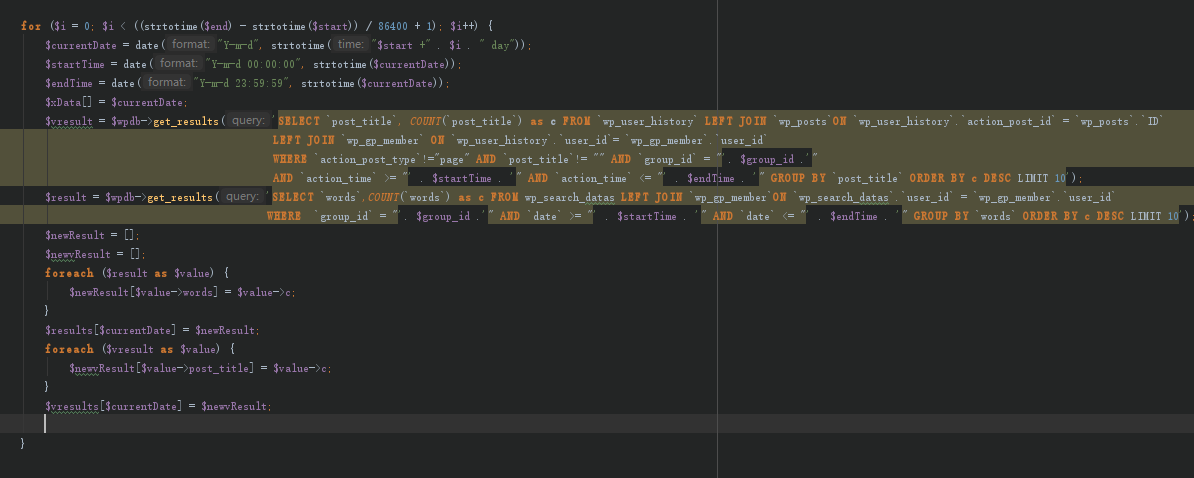


完成这么一个图，需要用到的数据有，时间、数据量以及被统计词条的数据名称。从图中我们可以看到，统计的每日数据中，包含的词条数据并不为一。因此，要用一个异性数组和一个一维数组来储存这个图所需要的数据。其中一维数组用来统计横轴的时间坐标。异性数组的结构如下：



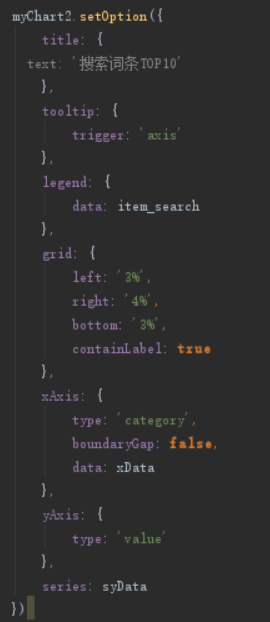
它包含了三个元素即，某一项数据一定时间段内的数值，用一个数组存储。以及数据的名称，和图像的类型，在这个图中类型为line.

为了实现这个异性数组的储存，我们需要用到一个for循环来对设定时间段内的所有需要用到的数据进行一个连续的筛选与获取。同时，需要用到一个PHP中的forecah方法，对每日获取的数组进行一个遍历，遍历的内容存储到另一个数组中。



数据可视化部分：

在我们获取了相应的数据，并且把数据转换成了需要用的数据结构之后，我们便可以结合插件e-charts的使用完成数据可视化的部分了。具体的实现代码为：



Result:

Again, most projects will have results, especially for a research project. But again you should talk to your supervisor about it.

我的整个项目做的是一个专门服务于网站[www.oursparkspace.cn](http://www.oursparkspace.cn)的数据获取于统计模块。在一开始的任务书中，给我设定的任务就分为了三个大的部分。第一个就是调研需求，学习相关技术。第二个是根据调研的需求设计出这个数据获取和统计模块的原型。第三个便是根据设计的原型完整这整个模块的前后端。

关于第一部分的调研任务，我在前期的时候就已经完成了。根据的我的调研结果，我把整个模块的服务人群的类别进行了一个区分。这就是之前提到的，根据使用这个平台的老师的授课课程类型的不同，我把他们分为了两个大类。第一个类别是，教授一门专业的课程，课程涉及学科内容比较专业并且局限于这个专业之中。第二个类别是，开展创新创业课程这类活动课程，课程涉及学科内容广泛具有很多跨专业结合的情况。这个调研结果，对我之后的项目设计有很重要的影响。

关于第二部分的项目设计任务，这个我在中期的时候就已经完成了。由于在之前的调研任务中，我合理的把整个平台的服务人群给分出了两个大类。所以，我的原型设计变得更加的有针对性了。对于第一类教授专业课程的老师，我在项目模块中设计了两个部分，主要都是为了帮助老师观察学生的学习是否符合教学进度，学习轨迹是否是一个合理方向。对于第二类开展创新创业课程的老师。我也在项目模块中设计了两个部分，主要都是为了帮助老师发现学生的整体兴趣分布，和关注的创新创业焦点。从而方便老师进行更加个性化的指导。

关于第三部分的项目实现任务，这个的具体细节我已经在上一届的实现部分中介绍完了。

所以，截至到现在，我所有的在任务书中的任务都已经完成了。

My entire project is a data acquisition and statistics module dedicated to the website www.oursparkspace.cn. In the beginning of the project specification form, the task set for me was divided into three major parts. The first is the research needs and learning related technologies. The second is to design the prototype of this data acquisition and statistics module based on the research needs. The third is to complete the front and back ends of the entire module based on the prototype of the design.

Regarding the first part of the research mission, I completed it in the earlier period. Based on my research results, I divided the categories of service people across the module. This is what I mentioned earlier. I divided them into two major categories based on the type of lectures taught by teachers using the platform. The first category is to teach a professional course. The course involves a more professional subject and is limited to this subject. The second category is that of conducting activities such as innovative entrepreneurship courses that involve a wide range of cross-professional integration of subject content. This research result has a very important influence on the design of my project.

On the second part of the project design task, this I completed in the middle of the time. Due to the previous research mission, I reasonably divided the service people of the entire platform into two major categories. So, my prototype design has become more targeted. For the first category of teacher to teach professional courses, I designed two parts in the project module, mainly to help teachers observe whether the student's learning is in line with the teaching progress, whether the learning track is a reasonable direction. For the second category of teacher who conduct innovative entrepreneurship courses. I also designed two parts in the project module, mainly to help teachers find students' overall interest distribution, and focus on innovation and entrepreneurship. In order to facilitate the teacher to carry out more personalized guidance.

Regarding the third part of the project implementation task, the details of this I have already introduced in the implementation part of the last session.

So, as of now, all my tasks in the project specification form have been completed.

对于一个项目来说，测试工作是很重要的。只有在测试之后，才能发现产品的不足和可以提升的地方。对于这个项目来说，它是一个直接服务于特定人群的模块。对于使用的人来说，他们不需要知道这个模块是如何实现的，他们只需要直接使用项目的功能就可以。所以，结合design by user的设计理念，在这个部分我会对几个重要的功能性木块进行测试。

For a project, test work is very important. Only after the test can you discover the insufficiency of the product and where it can be improved. For this project, it is a module that directly serves a specific group of people. For people who use it, they do not need to know how this module is implemented. They just need to use the project's funtions directly. So, combined with the design concept of design by user, I will test several important functional blocks in this section.

Conclusion:

The conclusion is an important part of the report, as it states what you have done for the project. It also concludes the findings of your research or the outcome of implementing a system.

A good conclusion will NOT repeat what you have done, but set out the achievements very crisply (2 pages should be sufficient).

Further work can be the next step of your research, or some functionality that can be added to the implementation to make it more practical.

NOTE: The maximum length of the report up to here is 50 pages.

目前，整个项目我已经按照任务书上的要求全部完成了。我主要完成了这么几个工作。第一个是，调查和研究了整个项目的实际应用情况，然后结合项目的实际应用情况对于项目的应用做了一个需求分析。第二个是，根据我的需求分析的结果，把项目的原型设计出来了。整个原型的设计包括了对于前端展示页面的设计，同时也包含了对于需要获取的数据内容的设计，也包含了对于部分增加的数据库表单的设计，以及数据库关系之间的设计。第三个就是根据我之前的原型设计，把整个项目在网站上实现出来。这其中包含了前端的实现，主要是参照之前的原型设计完成了前端的实现。以及后端的实现，主要内容为数据获取和数据格式的转换以及一些方法的设计，最后还有把这些相关的数据进行数据可视化的内容。这几个工作完成之后，我这个服务于教师端的学生信息获取与统计系统就已经完成了。

回顾整个项目的完成过程，我认为并不是一帆风顺的，但是到最后整个项目的完成，在解决这些遇到的困难和问题之后，这整个过程帮助我提升了很多。并且这种提升是多方面的提升，它不仅仅是说提升了我的编程能力去解决一个技术细节上的问题。它帮助我对于一个简单系统的设计和实现有了更深的理解。它也提升了我在做项目设计的时候思考方式，让我对于项目设计的考虑更加全面和细致。

At present, the entire project I have completed in accordance with the requirements of the project specification form. I mainly completed such a few tasks. The first is to investigate and study the actual application of the entire project, and then make a requirements analysis of the application of the project based on the actual application of the project. The second is based on the results of my needs analysis, the prototype of the project was designed. The design of the entire prototype includes the design of the front-end display page. It also includes the design of the data content to be acquired, and also includes the design of the partially added database form and the design of the database relationship. The third is to implement the entire project on the website based on my previous prototype design. This includes the implementation of the front-end, mainly to complete the front-end implementation with reference to the previous prototype design. And the realization of the back-end, the main content for the data acquisition and data format conversion and the design of some methods, and finally achieve the data visualization based on the previous acquired data. After the completion of these tasks, my student information acquisition and statistics system for teachers has been completed.

Looking back at the completion process of the entire project, I think it was not easy, but after the completion of the entire project, after solving these difficulties and problems, the whole process helped me to improve a lot. And this kind of promotion is a multi-faceted improvement. It is not just about improving my programming skills to solve a technical problem. It also helped me gain a deeper understanding of the design and implementation of a simple system. It also enhances my thinking when doing project design, so that I consider the project design more comprehensive and detailed. I think that these improvements in systemic thinking are also a big gain for me.

Everything you cite from other sources should be properly referenced. The QM Faculty of Science and Engineering has identified the Harvard and Vancouver referencing styles as the recommended styles for project reports. Details about the referencing style and examples can be found online at <https://qmplus.qmul.ac.uk/mod/book/view.php?id=653429>. Here are some examples:

**Books:**

Pitts, J. M., & Schormans, J. A. (2000). *Introduction to IP and ATM design and performance: with applications and analysis software.* New York: John Wiley. (047149187X)

**Journals:**

Chiau, C.C., Chen, X., & Parini, C. (2003). Multiperiod EBG structure for wide stopband circuits. *IEE Proceedings-Microwaves Antennas & Propagation, 150,* no.6, 489-92.

**Conference papers:**

Papadopoulos, S., & Parini, C. G. (1998). FDTD scattering by a dielectric strut in large geodesic space-frame radomes. In *International Symposium on Electromagnetic Theory. Proceedings. 25-28 May, 1998* (Vol.2, pp. 721-3). Thessaloniki: Aristotle University.

**Online sources:**

Abbott, K. (2004, May). *Finding information for Electronic Engineering, Engineering, Materials and the IRC in Biomedical Materials.* Retrieved May 27, 2004, from Queen Mary, University of London Library Web site: <http://www.library.qmul.ac.uk/>

Acknowledgement

在我的整个项目的实现过程中，我遇到了不少的困难和疑问。但是，每当我遇到困难和疑问的时候，都有人给予我一定的指引和帮助。所以，我想要在这里感谢在整个过程中帮助过我的人。

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再次感谢在我项目的整个实现过程中给予我帮助所有人。