1. Literature data was obtained using the crawler at "https://github.com/tomleung1996/wos\_crawler".
2. Use Navicat to open the "result.db" file obtained by crawling.
3. Export the table "wos\_keyword" as a csv file, use the program "key\_process.py" to process the exported file, get the processed "keyword\_final.csv" file, and re-import the "keyword\_final.csv" file into the Navicat database.
4. For the "keyword\_final.csv" file, use the program "all\_keyword\_fre.py" to obtain the "total\_ word\_frequency.csv" file.
5. Associate the tables "keyword\_final" and "wos\_document" in Navicat, create a new table "time" to get the year and month of each keyword, and export the "time" table as "time.csv".

SQL statement: create table time as select keyword\_final.document\_unique\_id, keyword\_final.keyword, wos\_document.pub\_year, wos\_document.pub\_month\_day from keyword\_final join wos\_document on keyword\_final.document\_unique\_id = wos\_document.unique\_id

1. Create a new "heatmap.csv" file, select the x keywords with the highest frequency in "total\_ word\_frequency.csv", set them as the first column of "heatmap.csv", and set the selected year as the first column of "heatmap.csv" one line.

图形用户界面, 应用程序, 表格, Excel

描述已自动生成

1. Run the "year\_frequent.py" program to process the "time.csv" and "heatmap.csv" files to get the "heatmaps.csv" file.
2. Run the "Heat\_Visualization.py" program to process the "heatmaps.csv" file to get the heat figure.

图片包含 QR 代码

描述已自动生成

1. Create a new "co-data.csv" file and copy the x keywords with the highest frequency in "total\_ word\_frequency.csv" and the word frequency to the "co-data.csv" table.

表格

描述已自动生成

1. Run the "Co\_Occ\_Matrix.py" program to process the "keyword\_final.csv" file and get the "Co\_score.csv" file.
2. Run the "Co\_Occurence.py" program to process the "Co\_score.csv" and "co-data.csv" files to obtain the co-occurrence figure.

图表, 图示, 旭日形

描述已自动生成

1. Run the following SQL code in Navicat to get a series of tables.

SQL statement: create table aaa as select corresponding\_author.document\_unique\_id, keyword\_final.keyword, corresponding\_author.author\_id from corresponding\_author join keyword\_final on corresponding\_author.document\_unique\_id = keyword\_final.document\_unique\_id

create table address as select aaa.document\_unique\_id, aaa.keyword, aaa.author\_id, wos\_affiliation.address from aaa join wos\_affiliation on aaa.author\_id = wos\_affiliation.author\_id

create table country as select corresponding\_author.document\_unique\_id, wos\_affiliation.address from corresponding\_author LEFT OUTER join wos\_affiliation on corresponding\_author.author\_id = wos\_affiliation.author\_id

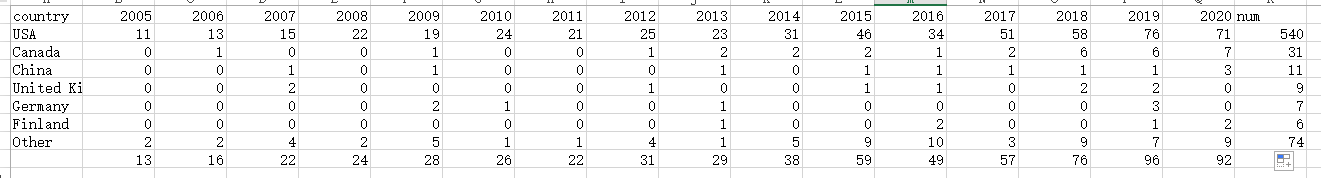
create table address\_time as select country.document\_unique\_id, wos\_document.pub\_year, country.address from country join wos\_document on country.document\_unique\_id = wos\_document.unique\_id

1. Export the table "address\_time" as "address\_time.csv" file.
2. Run the "address\_time\_process.py" program to process the "address\_time.csv" file to get the " number\_of\_articles\_by\_country\_per\_year.csv" file.
3. Open the "nation\_figure.py" program. On line 44 of the code, sort by the countries in the " number\_of\_articles\_by\_country\_per\_year.csv" file and re-enter the value of the "attr" country name attribute by the standardized name of the country in the nameMap on line 6 of the code. After re-entering the "attr" attribute, run the program, get "nation.html", and open it to get a map of the number of articles in the country.

蓝色的地图

描述已自动生成

1. Create a new "number\_of\_country\_articles.csv" file, select the annual data of the top 6 countries with the largest number of published articles according to the data in the " number\_of\_articles\_by\_country\_per\_year.csv", and merge the annual data of the remaining countries into The other lines form the " number\_of\_country\_articles.csv" file. The last line of the " number\_of\_country\_articles.csv" file counts the total number of all countries in each year, and the last column counts the total number of countries for all years.



1. Open the "nation\_time.py" program. On line 11 of the code, re-enter the "country\_data\_count" attribute according to the data in the "number\_of\_country\_articles.csv.csv" file. Run the "nation\_time.py" program to get a graph of the percentage of articles published by each country each year.

