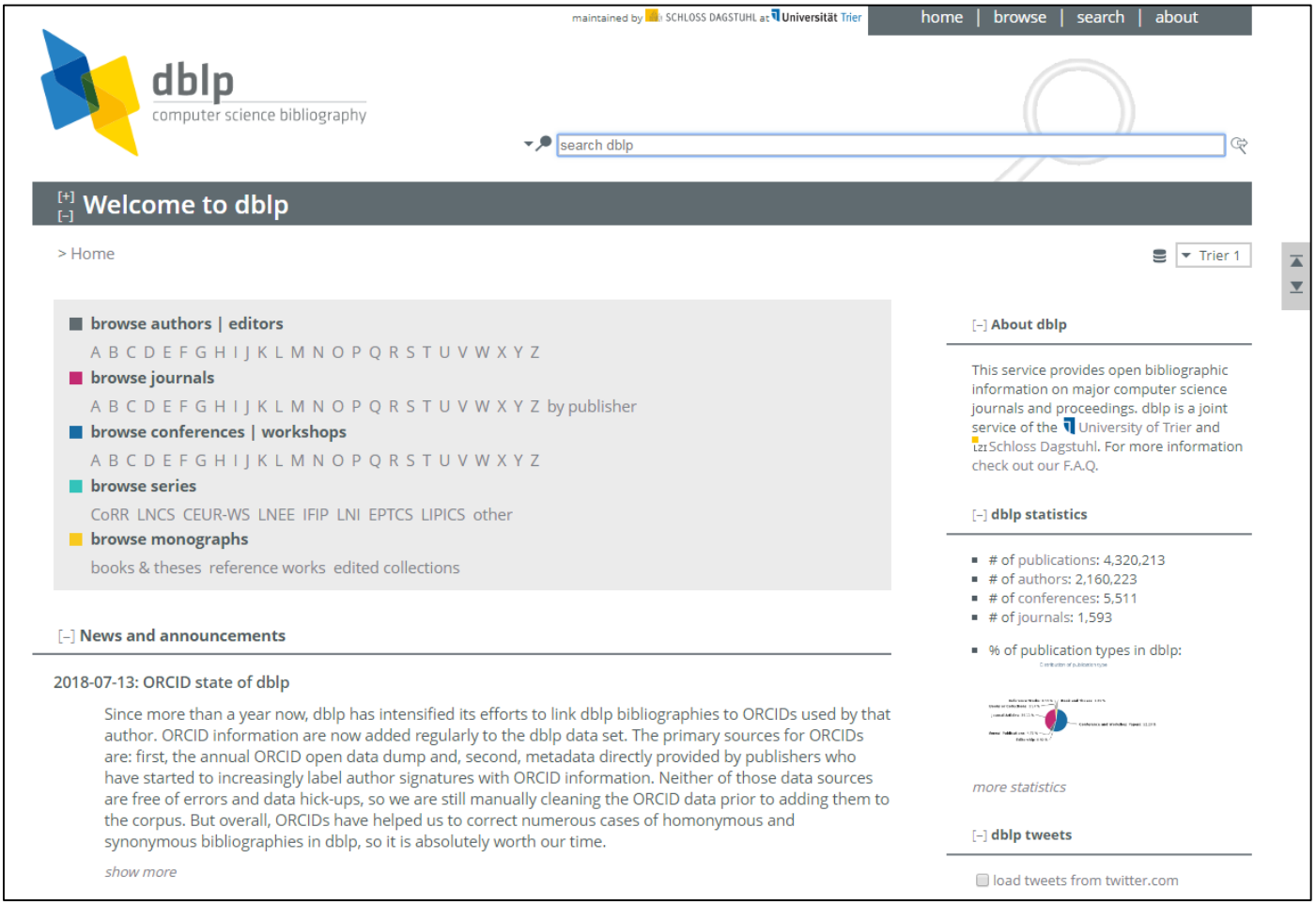
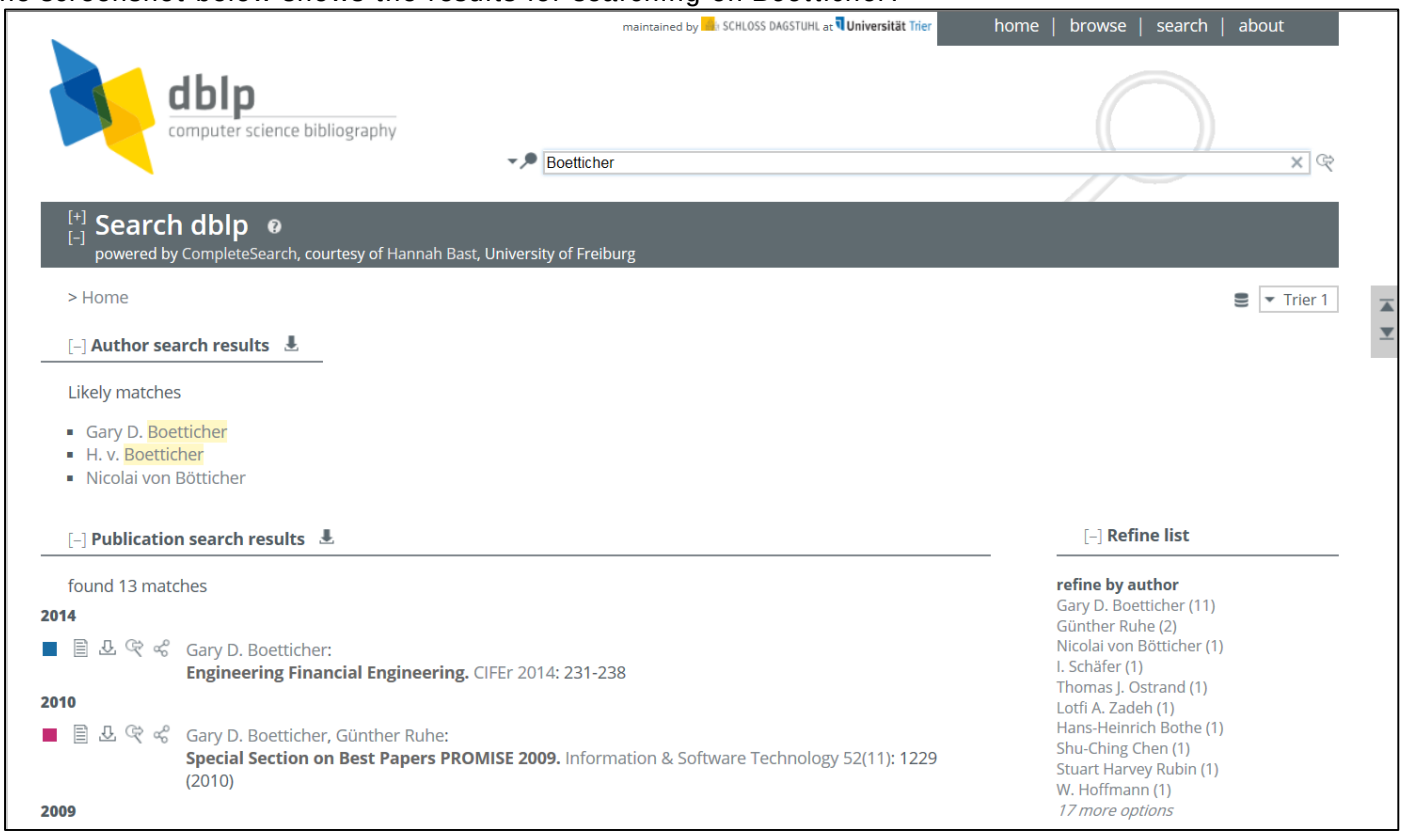
Big Data Analytics – Fall, 2018
Assignment 1
You make work in teams of up to 2 persons

dblp – Computer Science Bibliography

The dblp website provides a search tool for finding authors, journals/conferences/workshops, series and monographs in the area of Computer Science. The screenshot below shows the [home page](). I would recommend using Chrome instead of IE to view.



The screenshot below shows the results for searching on *Boetticher*.



Goal

For this assignment, you will apply the MapReduce algorithm to the Citation Network Dataset (A dblp dataset.).

Tasks

1) Go to the Citation Network Dataset website and review the details of the *DBLP-Citation-network V10* dataset in terms of number of records and attributes. Please note, there are many versions. We will be working with version 10. Please download version 10. The zip file is about 1.8 gigabytes. I have the zip file on a pen drive. If you want, see me during office hours or at break in class to get a copy of the zip file. Within the zip file is a folder which contains 4 json files (dblp-ref-0.json, dblp-ref-1.json, dblp-ref-2.json, and dblp-ref-3.json). The first 3 json files are about 1.4 gigabytes. The last one is 93 megabytes.

2) Included in the homework assignment is a very small json file called *dblp-ref-veryshort.json*. For this task make sure you can read the attributes correctly. To verify, print out the records. The data scheme is as follows:

Field Name	Field Type	Description	Example
id	string	paper ID	013ea675-bb58-42f8-a423-f5534546b2b1
title	string	paper title	Prediction of consensus binding mode geometries for related chemical series of positive allosteric modulators of adenosine and muscarinic acetylcholine receptors
authors	list of strings	paper authors	["Leon A. Sakkal", "Kyle Z. Rajkowski", "Roger S. Armen"]
venue	string	paper venue	Journal of Computational Chemistry
year	int	published year	2017
n_citation	int	citation number	0
references	list of strings	citing papers' ID	["4f4f200c-0764-4fef-9718-b8bccf303dba", "aa699fbf-fabe-40e4-bd68-46eaf333f7b1"]
abtract	string	abstract	This paper studies ...

Below is a sample record:


```
{
  "authors": [
    "Leon A. Sakkal",
    "Kyle Z. Rajkowski",
    "Roger S. Armen"
  ],
  "n_citation": 0,
  "references": [
    "4f4f200c-0764-4fef-9718-b8bccf303dba",
    "aa699fbf-fabe-40e4-bd68-46eaf333f7b1"
  ],
  "title": "Prediction of consensus binding mode geometries for related chemical series of positive allosteric modulators of adenosine and muscarinic acetylcholine receptors",
  "venue": "Journal of Computational Chemistry",
  "year": 2017,
  "id": "013ea675-bb58-42f8-a423-f5534546b2b1"
}
```

3) **References and citations**. In the sample record on the previous page. The paper has 3 authors who reference 2 papers. We may view this as follows:

Original Paper ID	→	**Referenced Paper ID**
013ea675-bb58-42f8-a423-f5534546b2b1	→	4f4f200c-0764-4fef-9718-b8bccf303dba
013ea675-bb58-42f8-a423-f5534546b2b1	→	aa699fbf-fabe-40e4-bd68-46eaf333f7b1

It is possible to "invert" the relationship. We call this **cited by**.

Paper ID	→	**"Cited by" Paper ID**
4f4f200c-0764-4fef-9718-b8bccf303dba	→	013ea675-bb58-42f8-a423-f5534546b2b1
aa699fbf-fabe-40e4-bd68-46eaf333f7b1	→	013ea675-bb58-42f8-a423-f5534546b2b1

Write a Python (or Java) program (or script) to write out two columns. The paperID along with the CitedBy PaperID for the *dblp-ref-veryshort.json* dataset.

4) **MapReduce problem 1**. For any given paper, we want to know how many times it was cited. Initially, apply your code to the *dblp-ref-veryshort.json* dataset. I have modified the data so that it does give back some results. Your output should include a paperID and a count of the number of times it was cited.

   Modify your code so that it returns the most influential paper (which is the one most cited) only.

5) Modify your program to determine the 5 most influential papers. These are papers that are most cited.

   Run this program against the *dblp-ref-veryshort.json* dataset.

   Next, run this program against the *dblp-ref-3.json* dataset (See step 1).

   Bonus: See if you can run it against all 4 data sets from step 1.

6) **MapReduce problem 2**. Write a mapReduce program that will determine how many papers an author wrote. Any paper may have one or more authors. In this case, each author gets credit for having written one paper. Run this against the *dblp-ref-veryshort.json* dataset.

   We will ignore the following two issues:

   A) An author's name may vary from paper to paper. For example, G. Boetticher, Gary Boetticher, or GD Boetticher may refer to the same author. Count this as 3 separate authors.

   B) There may be two or more authors with the exact same name. To simplify the problem, assume that it is always the same person.

7) Modify your program to determine the 5 most influential authors. These are authors that have written the most papers.

   Run this program against the dblp-ref-veryshort.json dataset.

   Next, run this program against the dblp-ref-3.json dataset (See step 1).

   Bonus: See if you can run it against all 4 data sets from step 1.

8) **MapReduce problem 3**. MapReduce problem 1 determined the 5 most influential papers. The MapReduce problem 2 determined the 5 most influential authors. This problem builds on those first two mapReduce problems. For each author, determine the average citation of their 3 was most influential papers. Output the top ten authors (the ones with the highest citation average).

   Run this program against the dblp-ref-veryshort.json dataset.

   Next, run this program against the dblp-ref-3.json dataset (See step 1).

   Bonus: See if you can run it against all 4 data sets from step 1.

Deliverables

1) Use the following naming convention for the zip file:
   If you work alone:
   Last name_FirstName_HW1.ZIP
   If you work as a group of two:
   LastName1FirstName1LastName2FirstName2_HW3.ZIP

   For example: Rajiv Gandhi and Shriya Saran would be:
   GandhiRajivSaranShriya_HW1.ZIP
2) If you work in a group, make sure to CC your partner in your submission.
3) If you work in a group, make only one submission.
4) What to place in the zip file?
   A) Documented Java or Python code.
   B) A ReadMe file that explains how to run your code.
   C) An MS-Word or PDF file that contains screenshots showing your results for most influential paper, most influential author, and highest citation average. Also, specify the dataset used for each screenshot. Include your names at the beginning of the document.
   D) Do not include any datasets.

Due Date: Wednesday, October 24th, 7 PM via email.

Email it to boetticher@uhcl.edu

To make life simple, do not email your solution to the TA.