KORONA – Overview

1. Splitting of DBLP-data	
Create directory „nt-files“	
`split -l 100000 dblp-2017-04-18.nt nt-files/` `for file in *; do mv "$file" "${file%}.nt"; done`	
Input	
DBLP NT-Triples dump file	**dblp-2017-04-18.nt**

`<http://dblp.org/rec/journals/amco/WangG13>`
`<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>`
`<http://dblp.org/rdf/schema-2017-04-18#Publication> .`
[…]	

Output	
620 split NT-Triples files containing max. 100,000 lines of the original file	**nt-files/….nt**

`<http://dblp.org/rec/journals/amco/WangG13>`
`<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>`
`<http://dblp.org/rdf/schema-2017-04-18#Publication> .`
[…]	

2. Filtering and reduction of DBLP-data	
Install libraries `nose` / `tornado` / `rdflib` / `openpyxl`	
`sudo python` **`1.\ filter-nt.py`**	
Input	
620 split NT-Triples files	**nt-files/….nt**

`<http://dblp.org/rec/journals/amco/WangG13>`
`<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>`
`<http://dblp.org/rdf/schema-2017-04-18#Publication> .`
[…]	

Output	
A single accumulated NT-Triples file containing only triples with the subject prefix “`http://dblp.org/rec/conf/semweb/`”	**ISWC.nt**

`<http://dblp.org/rec/conf/semweb/0001CDB0VA16>`
`<http://dblp.org/rdf/schema-2017-04-18#publishedInBook>`
`"International Semantic Web Conference (2)" .`
[…]	

3. Feature selection

`sudo python` **`2.\ rdflib2excel.py`**

Input

NT-Triples file	**`ISWC.nt`**

```
<http://dblp.org/rec/conf/semweb/0001CDB0VA16>
      <http://dblp.org/rdf/schema-2017-04-18#publishedInBook>
      "International Semantic Web Conference (2)"    .

[…]
```

Output

Excel spreadsheet containing information filtered on the predicates title of paper, author name, and year of publication. Each row represents one paper	**`metis.xlsx`**

```
[Paper Number] [Title] [Number of Authors] [Year]

[1] [TripleWave: Spreading RDF Streams on the Web.] [7] [2016]
[http://dblp.org/pers/c/Calbimonte:Jean=Paul]
[http://dblp.org/pers/d/Dell=Aglio:Daniele]
[http://dblp.org/pers/b/Brambilla_0001:Marco]
[http://dblp.org/pers/a/Aberer:Karl]
[http://dblp.org/pers/v/Valle:Emanuele_Della]
[http://dblp.org/pers/b/Balduini:Marco]
[http://dblp.org/pers/m/Mauri_0001:Andrea]

[…]
```

4. Generation of Conference similarity matrix and bipartite graph

Install library `bs4` and create directory “output”
Replace `wb.get_active_sheet()` function in source code with `wb.active`

`sudo python` **`3.\ similarities.py`**

Input

Excel spreadsheet	**`metis.xlsx`**

```
[Paper Number] [Title] [Number of Authors] [Year]

[1] [TripleWave: Spreading RDF Streams on the Web.] [7] [2016]
[http://dblp.org/pers/c/Calbimonte:Jean=Paul]
[http://dblp.org/pers/d/Dell=Aglio:Daniele]
[http://dblp.org/pers/b/Brambilla_0001:Marco]
[http://dblp.org/pers/a/Aberer:Karl]
[http://dblp.org/pers/v/Valle:Emanuele_Della]
[http://dblp.org/pers/b/Balduini:Marco]
[http://dblp.org/pers/m/Mauri_0001:Andrea]

[…]
```

Output

Output file for indexing authors	**`output/author-key-map.txt`**

```
A1    http://dblp.org/pers/c/Calbimonte:Jean=Paul
A2    http://dblp.org/pers/d/Dell=Aglio:Daniele
[…]
```

List of authors	**output/author-list.txt**
http://dblp.org/pers/c/Calbimonte:Jean=Paul http://dblp.org/pers/d/Dell=Aglio:Daniele […]	
Author vertices file	**output/Author.txt**
4918 A1 A2 […]	
Conference vertices file	**output/Conf.txt**
16 C2001 C2002 […]	
Conference similarity matrix file	**output/Conf_matrix.txt**
16 1.0 0.128205128205 0.0637254901961 0.0524861878453 0.0498866213152 0.0329457364341 0.0314569536424 0.021613832853 0.0289115646259 0.0267295597484 0.0201863354037 0.0132352941176 0.0147895335609 0.0126467931346 0.0147213459516 0.0143027413588 […]	
Bipartite graph with weighted edges from authors to conferences (matrix)	**output/Auth-Conf_graph.txt**
8214 A1 C2010 edge 0.0714285714286 […]	

5. Conversion of author URIs to names

Install library `lxml`
Create directory “Problems” and file “404.txt” in this directory

```
sudo python 5.\ authorname4mlink.py
```

Input

File for indexing authors with URIs	**output/author-key-map.txt**
A1 http://dblp.org/pers/c/Calbimonte:Jean=Paul A2 http://dblp.org/pers/d/Dell=Aglio:Daniele […]	

Output

File for indexing authors with names	**output/author-key-map.txt**
A1 Marco Brambilla A2 Daniele Dell'Aglio […]	

File with URIs	**output/Problems/404.txt**
http://dblp.org/pers/c/Cecconi:Cecile http://dblp.org/pers/l/Lefort:Laurent http://dblp.org/pers/k/Kontokostas:Dimitris […]	

6. Identification of duplicates

```
sudo python3 find-duplicates.py
```

Input

File for indexing authors	**output/author-key-map.txt**

```
A1    http://dblp.org/pers/c/Calbimonte:Jean=Paul
A2    http://dblp.org/pers/d/Dell=Aglio:Daniele
[…]
```

List of authors	**output/author-list.txt**

```
http://dblp.org/pers/c/Calbimonte:Jean=Paul
http://dblp.org/pers/d/Dell=Aglio:Daniele
[…]
```

Output

File containing authors occurring more than once	**output/Problems/duplicate_links.txt**

```
1.Duplicated Author Number
Author Name: Maarten Menken
Duplicated Links:
http://dblp.org/pers/m/Menken:Maarten_R=
http://dblp.org/pers/m/Menken:Maarten
```

File containing URIs corresponding to duplicate author names	**output/de-duplicate.txt**

```
http://dblp.org/pers/m/Menken:Maarten_R=
      http://dblp.org/pers/m/Menken:Maarten
```

7. Elimination of duplicates

```
sudo python3 remove_duplicates.py
```

Input

File containing URIs corresponding to duplicate author names	**output/de-duplicate.txt**

```
http://dblp.org/pers/m/Menken:Maarten_R=
      http://dblp.org/pers/m/Menken:Maarten
```

NT-Triples file	**ISWC.nt**

```
<http://dblp.org/rec/conf/semweb/0001CDB0VA16>
      <http://dblp.org/rdf/schema-2017-04-18#publishedInBook>
      "International Semantic Web Conference (2)"    .

[…]
```

Output

NT-Triples file without duplicate authors	**output/Filtered-ISWC.nt**

```
<http://dblp.org/rec/conf/semweb/0001CDB0VA16>
      <http://dblp.org/rdf/schema-2017-04-18#publishedInBook>
      "International Semantic Web Conference (2)"    .

[…]
```

8. Replace URIs for duplicate authors in NT-Files	
javac **RemoveDuplicatesNTFiles.java** java RemoveDuplicatesNTFiles	
Input	
620 NT-Triples files	**nt-files/….nt**
<http://dblp.org/rec/journals/amco/WangG13> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://dblp.org/rdf/schema-2017-04-18#Publication> . […]	
List of URIs for duplicate authors	**output/de-duplicate.txt**
http://dblp.org/pers/m/Menken:Maarten_R= http://dblp.org/pers/m/Menken:Maarten	
Output	
620 NT-Triples files with redundant URIs replaced	**f_nt-files/….nt**
<http://dblp.org/rec/journals/amco/WangG13> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://dblp.org/rdf/schema-2017-04-18#Publication> . […]	

Repeat steps 3 to 5 with new ISWC-file.

9. Generation of Author similarity matrix	
Correct path to NT-files in the source code file	
sudo python **4.\ author\ similarity.py**	
Input	
620 split NT-Triples files	**nt-files/….nt**
<http://dblp.org/rec/journals/amco/WangG13> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://dblp.org/rdf/schema-2017-04-18#Publication> . […]	
List of authors	**output/author-list.txt**
http://dblp.org/pers/c/Calbimonte:Jean=Paul http://dblp.org/pers/d/Dell=Aglio:Daniele […]	
Output	
Author similarity matrix file	**output/Auth_matrix.txt**
4918 1.0 0.352112676056 0.0289256198347 0.0543293718166 0.180124223602 […] […]	

10. Calculation of percentiles

```
sudo python 6.\ get_percentiles.py output/Conf_matrix.txt
sudo python 6.\ get_percentiles.py output/Auth_matrix.txt
```

Input

Conference similarity matrix	**output/Conf_matrix.txt**

```
16

1.0 0.128205128205 0.0637254901961 0.0524861878453 0.0498866213152
0.0329457364341 0.0314569536424 0.021613832853 0.0289115646259
0.0267295597484 0.0201863354037 0.0132352941176 0.0147895335609
0.0126467931346 0.0147213459516 0.0143027413588

[…]
```

Output

```
Min: 0.0108
Max: 0.1743
Average: 0.0691
Median: 0.0616

Percentile    Similarity
10   0.0199
15   0.0266
20   0.0296
25   0.0317
30   0.0401
35   0.0496
40   0.0513
45   0.0554
50   0.0616
55   0.0673
60   0.0717
65   0.0807
70   0.0866
75   0.0981
80   0.1057
85   0.1211
90   0.1290
95   0.1479
98    0.1586
```

Input

Author similarity matrix	**output/Auth_matrix.txt**

```
4918
1.0 0.352112676056 0.0289256198347 0.0543293718166 0.180124223602 […]
[…]
```

Output

```
Min: 0.0007
Max: 1.0000
Average: 0.0697
Median: 0.0396

Percentile    Similarity
10   0.0105
```

```
15   0.0137
20   0.0169
25   0.0202
30   0.0237
35   0.0272
40   0.0311
45   0.0351
50   0.0396
55   0.0444
60   0.0500
65   0.0571
70   0.0652
75   0.0750
80   0.0882
85   0.1061
90   0.1379
95   0.2000
98    0.3333
```

S1. Application of semEP

```
./semEP -p <-l left threshold> <-r right threshold>
testdblp/Auth_matrix.txt testdblp/Author.txt
testdblp/Conf_matrix.txt testdblp/Conf.txt testdblp/Auth-
Conf_graph.txt
```

Output

Folder containing computed clusters	**nr_drug-target_graph-0.3061-0.1614-Clusters**

```
[…]
A1853 C2011 0.0714      edge
A2188 C2011 0.0714      edge
A2185 C2011 0.0714      edge
A2186 C2011 0.0714      edge
A2189 C2011 0.0714      edge
[…]
```

Text file containing predictions	**nr_drug-target_graph-0.3061-0.1614-Predictions**

```
Cluster     1051
A218  C2015 0.5000
A2325 C2014 0.5000
Cluster     1056
A245  C2015 0.5000
A1431 C2016 0.5000
Cluster     1061
A266  C2015 0.5000
A3898 C2014 0.5000
[…]
```

11. Generation of similarities matrix

Create directory “simrelations”

```
sudo python 7.\ sim_matrix_with_rel_constraints.py <threshold_1> <threshold_2> output/Auth_matrix.txt output/Author.txt output/Conf_matrix.txt output/Conf.txt output/Auth-Conf_graph.txt simrelations/<output_file>
```

Output

Text file containing the matrix with similarities between all pairs or relations	**output.txt**

```
1.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0, […]
0.0,1.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0, […]
0.0,0.0,1.0,0.151231945624,0.0,0.0,0.0,0.352112676056, […]
[…]
```

M1. Generation of METIS graph

```
sudo python3 10.generate_metis_graph.py <number of columns sim-matrix> <similarity matrix of relations> <output file name>
```

Input

Text file containing the matrix with similarities between all pairs of relations	**simrel.txt**

```
1.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0, […]
0.0,1.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0, […]
0.0,0.0,1.0,0.151231945624,0.0,0.0,0.0,0.352112676056, […]
[…]
```

Output

Text file containing the METIS graph	**metisgraphs.txt**

```
8214 298122 001
74 339 75 2177 160 2178 305 455 306 2921 326 344 327 2209 […]
[…]
```

M2. Application of METIS

In folder `/metisinstall/bin`

```
./gpmetis <filename> <nparts>
```

nparts is the number of clusters created

```
./gpmetis ../graphs/metis85.txt 1391
```

Input

Text file containing the METIS graph	**metisgraph.txt**

```
8214 298122 001
74 339 75 2177 160 2178 305 455 306 2921 326 344 327 2209 […]
[…]
```

Output

METIS-output file	**metis85.txt.part.1391**

```
414
1193
209
85
835
[…]
```

M3. Convert METIS-output to semEP-output

Create folder “metis2semep/85/”

```
sudo python 11.\ metis2semEP.py output/Auth-Conf_graph.txt
graphs/metis85.txt.part.1391 metis2semep/85/
```

Input

METIS-output file	**metis85.txt.part.1391**

```
414
1193
209
[…]
```

Output

Folder containing computed clusters in semEP format	**metis2semep/85/**

```
[…]
A1853 C2011 0.0714      edge
A2188 C2011 0.0714      edge
A2185 C2011 0.0714      edge
A2186 C2011 0.0714      edge
A2189 C2011 0.0714      edge
[…]
```

12. Computation of clustering measures

./cma ../*<semEP clusters directory>* ../output/Auth-Conf_graph.txt ../simrelations/*<simrel_file>*

Output

```
Starting the application
Cluster files folder: Auth-Conf_graph-0.2000-0.1479-Clusters
Number of cluster: 3291
Number of edges: 8214
Similarity matrix loaded!
Computing measures........

***********************************
Clustering measures
***********************************
#Cluster Conductance
0    0.000000000000
Starting the application
Cluster files folder: Auth-Conf_graph-0.2000-0.1479-Clusters
Number of cluster: 3291
Number of edges: 8214
Similarity matrix loaded!
Computing measures........

***********************************
Clustering measures
***********************************
#Cluster Conductance
   0     0.000000000000

[…]

1228 0.896971921922
1229 0.306936798062
1230 1.000000000000
1231 0.333950046254
1232 0.357992311410
1233  0.000000000000

[…]

3288 0.864894706763
3289 0.959921001461
3290 0.934109856227
***********************************
Max conductance:   1.000000000000
Min conductance:   0.000000000000
Average conductance:    0.523881036852
Coverage:0.109763276452
Modularity:    0.099878732594
Total cut:    48010.683951266088
***********************************

Total time 18.037 secs
```