Leveraging Institutional Data For Author Name Disambiguation

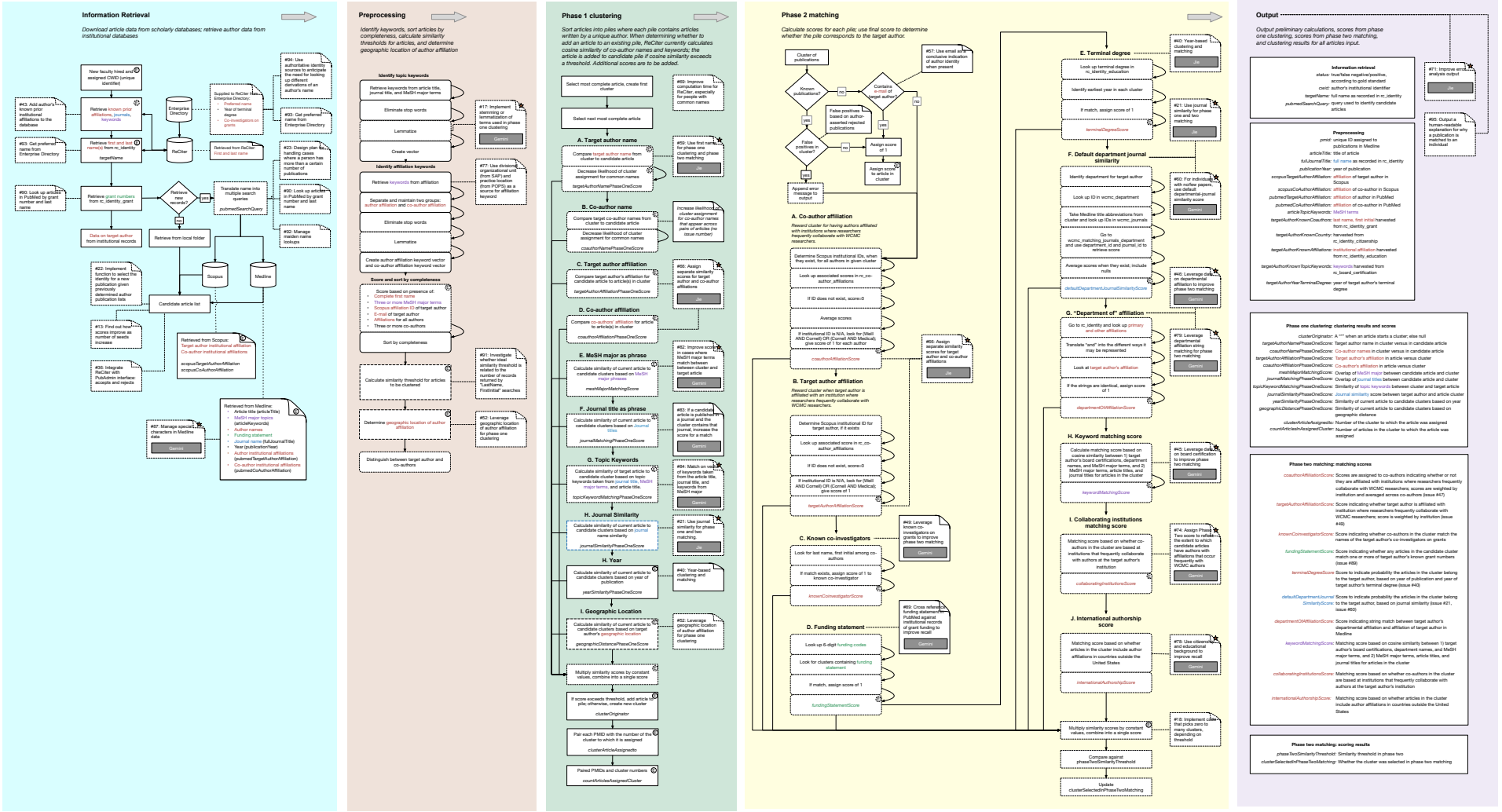
Michael Bales, Paul Albert, Jie Lin, and Stephen Johnson

The challenge: Author name disambiguation

ReciterArchitecture and Data Processing Operations

Last updated June 25th, 2015

Michael Bales, Paul Albert, Jie Lin, and Stephen Johnson, Weill Cornell Medical College



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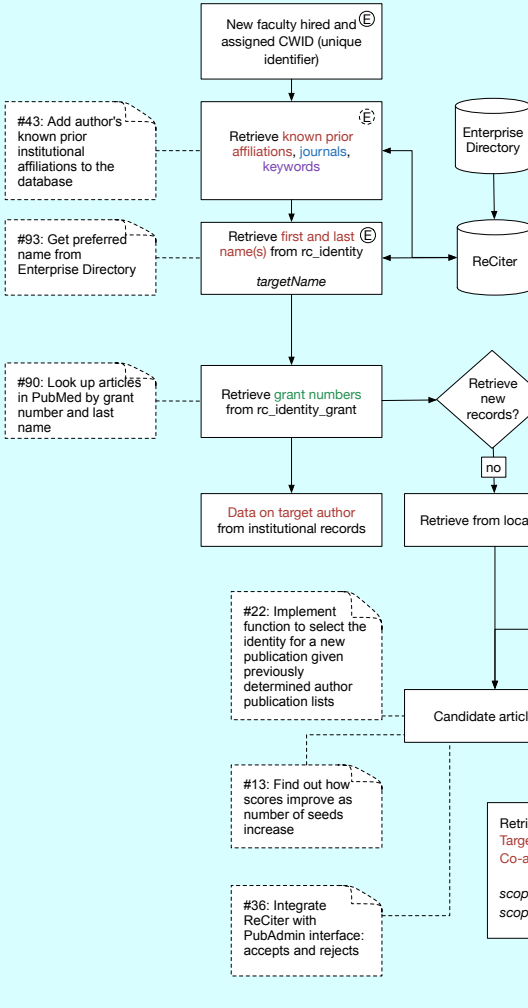
Information Retrieval

Download article data from scholarly databa
institutional databases



Weill Cornell Medical College

Data type coloring

- Person
- Grant
- Journal
- Keyword

To be completed

Completed

Priority

Appears in error analysis output

To appear in error analysis output

E. Terminal degree

Look up terminal degree in rc_identity_education

Identify earliest year in each cluster

If match, assign score of 1

terminalDegreeScore

#40: Year-based clustering and matching — Jie

#21: Use journal similarity for phase one and two matching — Jie

F. Default department journal similarity

Identify department for target author

Look up ID in wcmc_department

Take Medline title abbreviations from cluster and look up IDs in wcmc_journals

Go to wcmc_matching_journals_department and use department_id and journal_id to retrieve score

Average scores when they exist; include nulls

defaultDepartmentJournalSimilarityScore

#60: For individuals with no/few papers, use default departmental-journal similarity score — Gemini

#46: Leverage data on departmental affiliation to improve phase two matching — Gemini

G. "Department of" affiliation

Go to rc_identity and look up primary and other affiliations

Translate "and" into the different ways it may be represented

Look at target author's affiliation

If the strings are identical, assign score

#79: Leverage departmental affiliation string matching for phase two matching — Gemini

Output

Output preliminary calculations, scores from phase one clustering, scores from phase two matching, and clustering results for all articles input.

#71: Improve error analysis output — Jie

#95: Output a human-readable explanation for why a publication is matched to an individual

Information retrieval

status: true/false negative/positive, according to gold standard
cwid: author's institutional identifier
targetName: full name as recorded in rc_identity
pubmedSearchQuery: query used to identify candidate articles

Preprocessing

pmid: unique ID assigned to publications in Medline
articleTitle: title of article
fullJournalTitle: full name as recorded in rc_identity
publicationYear: year of publication
scopusTargetAuthorAffiliation: affiliation of target author in Scopus
scopusCoAuthorAffiliation: affiliation of co-author in Scopus
pubmedTargetAuthorAffiliation: affiliation of author in PubMed
pubmedCoAuthorAffiliation: affiliation of co-author in PubMed
articleTopicKeywords: MeSH terms
targetAuthorKnownCoauthors: last name, first initial harvested from rc_identity_grant
targetAuthorKnownCountry: harvested from rc_identity_citizenship
targetAuthorKnownAffiliations: institutional affiliation harvested from rc_identity_education
targetAuthorKnownTopicKeywords: keywords harvested from rc_board_certification
targetAuthorYearTerminalDegree: year of target author's terminal degree

Phase one clustering: clustering results and scores

clusterOriginator: A "*" when an article starts a cluster; else null
targetAuthorNamePhaseOneScore: Target author name in cluster versus in candidate article
coauthorNamePhaseOneScore: Co-author names in cluster versus in candidate article
targetAuthorAffiliationPhaseOneScore: Target author's affiliation in article versus cluster
coauthorAffiliationPhaseOneScore: Co-author's affiliation in article versus cluster
meshMajorMatchingScore: Overlap of MeSH major between candidate article and cluster
journalMatchingPhaseOneScore: Overlap of journal titles between candidate article and cluster
topicKeywordMatchingPhaseOneScore: Similarity of topic keywords between cluster and target article

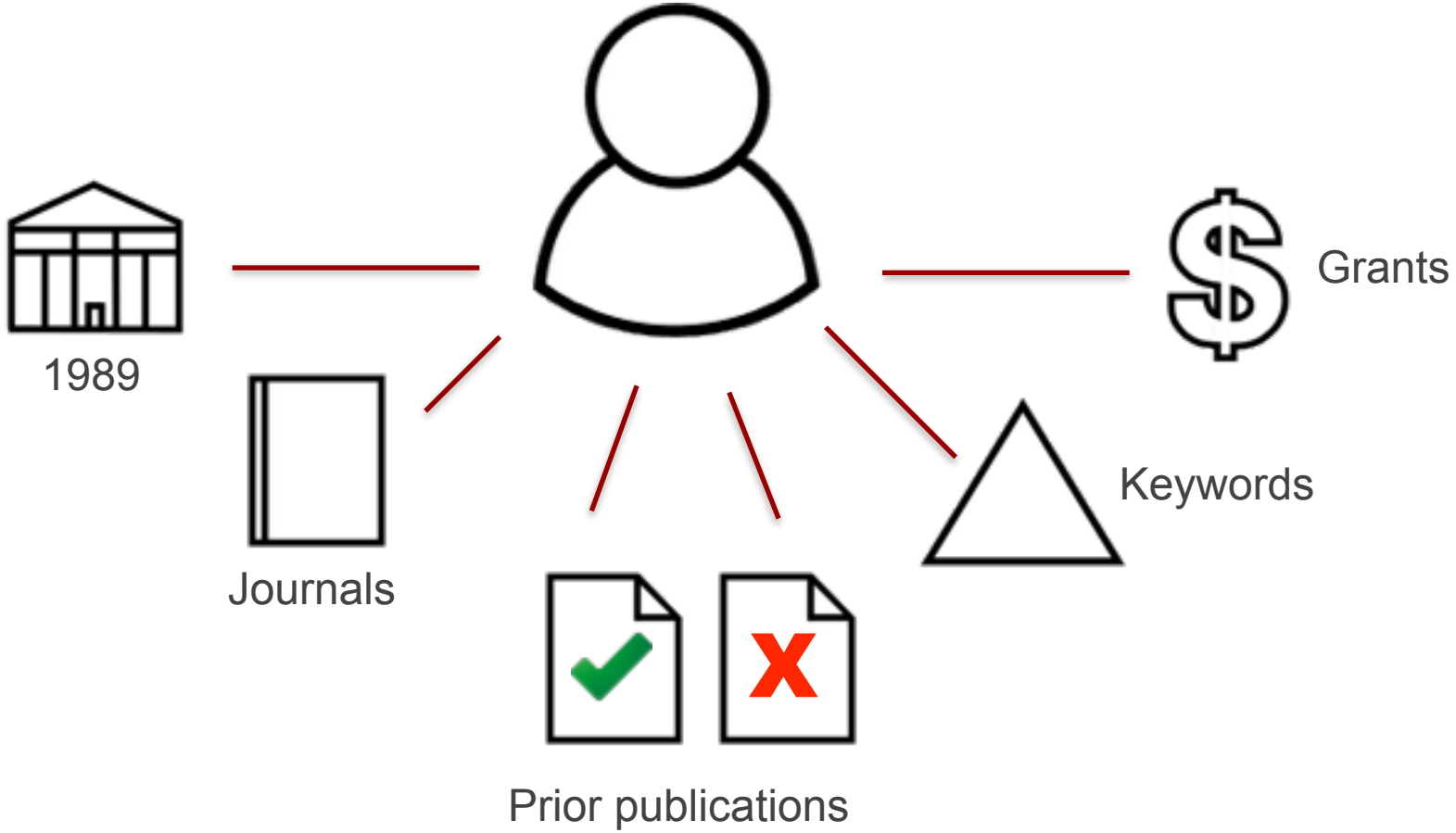
ReCiter Phases

- Information retrieval
- Preprocessing
- Phase one clustering
- Phase two matching
- Output

Use cases

1. Identify publications authored by new member of WCMC community
2. Assign newly identified publications

Evidence



ReCiter Evidence Types - Target Author

- First name, last name, middle initial
- Board certifications and clinical expertise
- Year of terminal degree
- Institutions where degrees earned
- E-mail address
- Known prior affiliations
- Geographic location of affiliation
- Grants & co-investigators

ReCiter Evidence Types, continued

- Target author prior publications
  - Journals
  - MeSH major topics
  - Co-authors
    - Names
    - Institutional affiliations
- WCMC collaborating institutions

ReCiter - Selected Evidence for Authors

Data	Source	Example	Phase 1	Phase 2
Known publication	Publications management	12923412	Yes	Yes
Job title	WOOFA	Professor of Medicine	No	Yes
Primary department	WOOFA	Medicine	No	Yes
Appointment period	WOOFA	1978 - current	No	Yes
Board certifications	Physicians profile	Cardiovascular disease	No	Yes
Citizenship	WOOFA	United States	No	Yes
Degree	WOOFA	Doctoral, 1971	No	Yes
Alma mater	WOOFA	Yale University, 1971	No	Yes
Grant	Coeus	5 U01 HL54495-10 EWOF	No	Yes

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journal homepage: www.elsevier.com/locate/yjbin

Automatic generation of investigator bibliographies for institutional research networking systems

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[a] Department of Public Health, Weill Cornell Medical College, New York, United States
[b] Department of Biomedical Informatics, Columbia University, New York, United States
[c] The Irving Institute for Clinical and Translational Research, Columbia University, New York, United States
[d] Samuel J. Wood Library, Weill Cornell Medical College, New York, United States

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MEDLINE
Natural language processing
Pattern recognition
Automated

ABSTRACT

Objective: Publications are a key data source for investigator profiles and research networking systems. We developed ReCiter, an algorithm that automatically extracts bibliographies from PubMed using institutional information about the target investigators.
Methods: ReCiter executes a broad query against PubMed, groups the results into clusters that appear to constitute distinct author identities and selects the cluster that best matches the target investigator. Using information about investigators from one of our institutions, we compared ReCiter results to queries based on author name and institution and to citations extracted manually from the Scopus database. Five judges created a gold standard using citations of a random sample of 200 investigators.
Results: About half of the 10,471 potential investigators had no matching citations in PubMed, and about 45% had fewer than 70 citations. Interrater agreement (Fleiss' kappa) for the gold standard was 0.81. Scopus achieved the best recall (sensitivity) of 0.81, while name-based queries had 0.78 and ReCiter had 0.69. ReCiter attained the best precision (positive predictive value) of 0.93 while Scopus had 0.85 and name-based queries had 0.31.
Discussion: ReCiter accesses the most current citation data, uses limited computational resources and minimizes manual entry by investigators. Generation of bibliographies using named-based queries will not yield high accuracy. Proprietary databases can perform well but require manual effort. Automated generation with higher recall is possible but requires additional knowledge about investigators.

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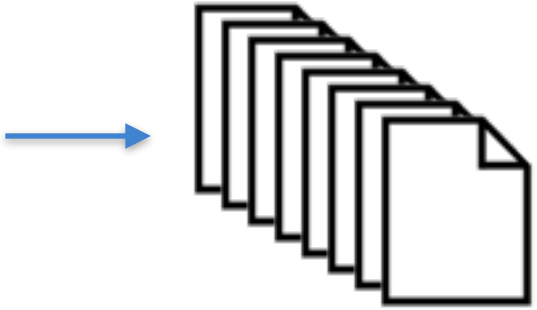
How ReCiter Works

Ana Santos-Carvallo

Santos A[AU] OR
Santos-Carvallo A[AU]



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How ReCiter Works

Ana Santos-Carvallo

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Cluster 1

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Cluster 1

Cluster 2

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Cluster 2

Cluster 3

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Cluster 1

Cluster 2

Cluster 3

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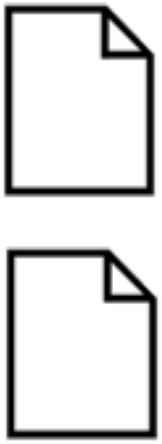
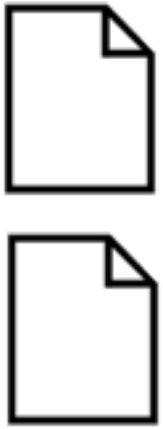
Cluster 1



Cluster 2



Cluster 3

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How ReCiter Works

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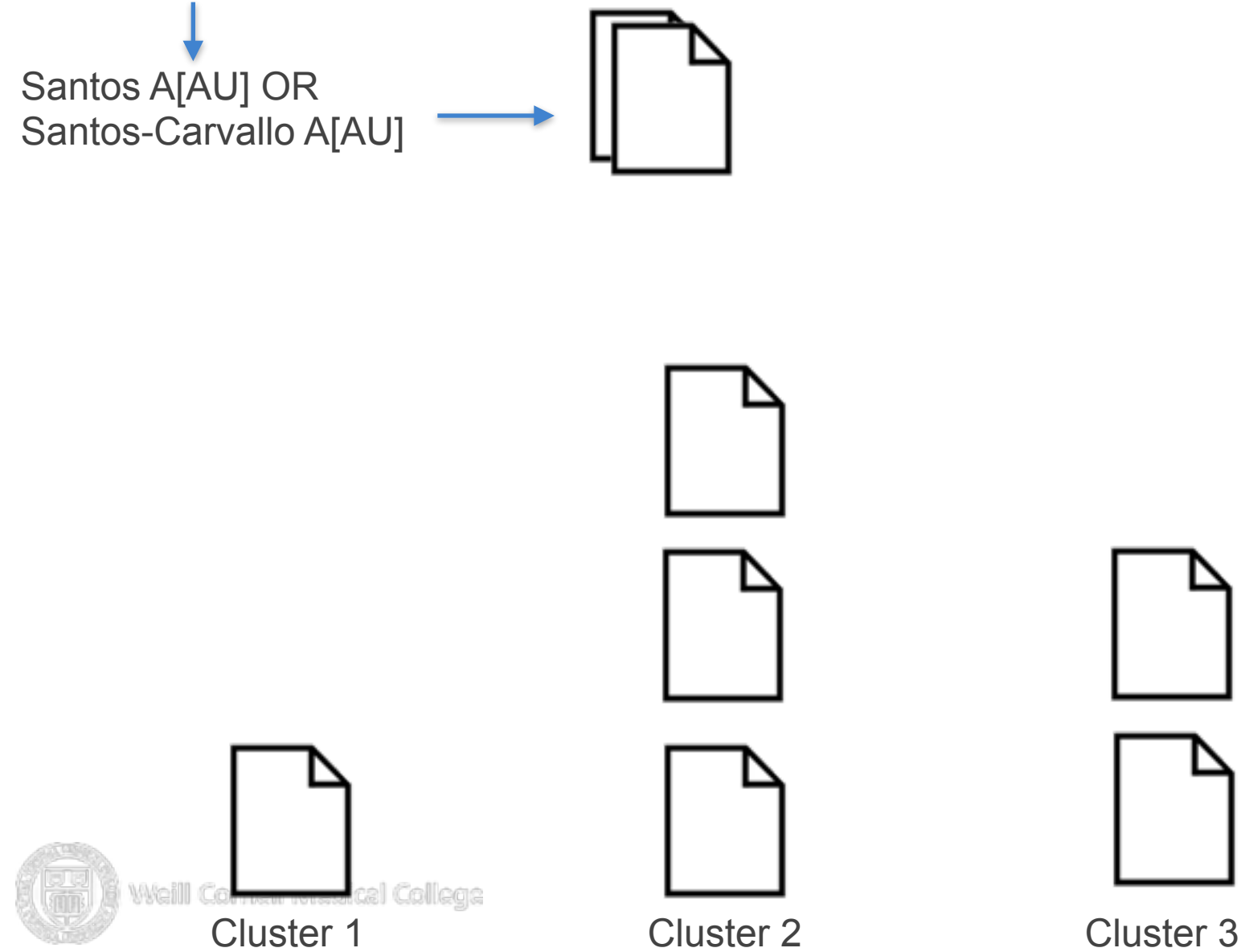

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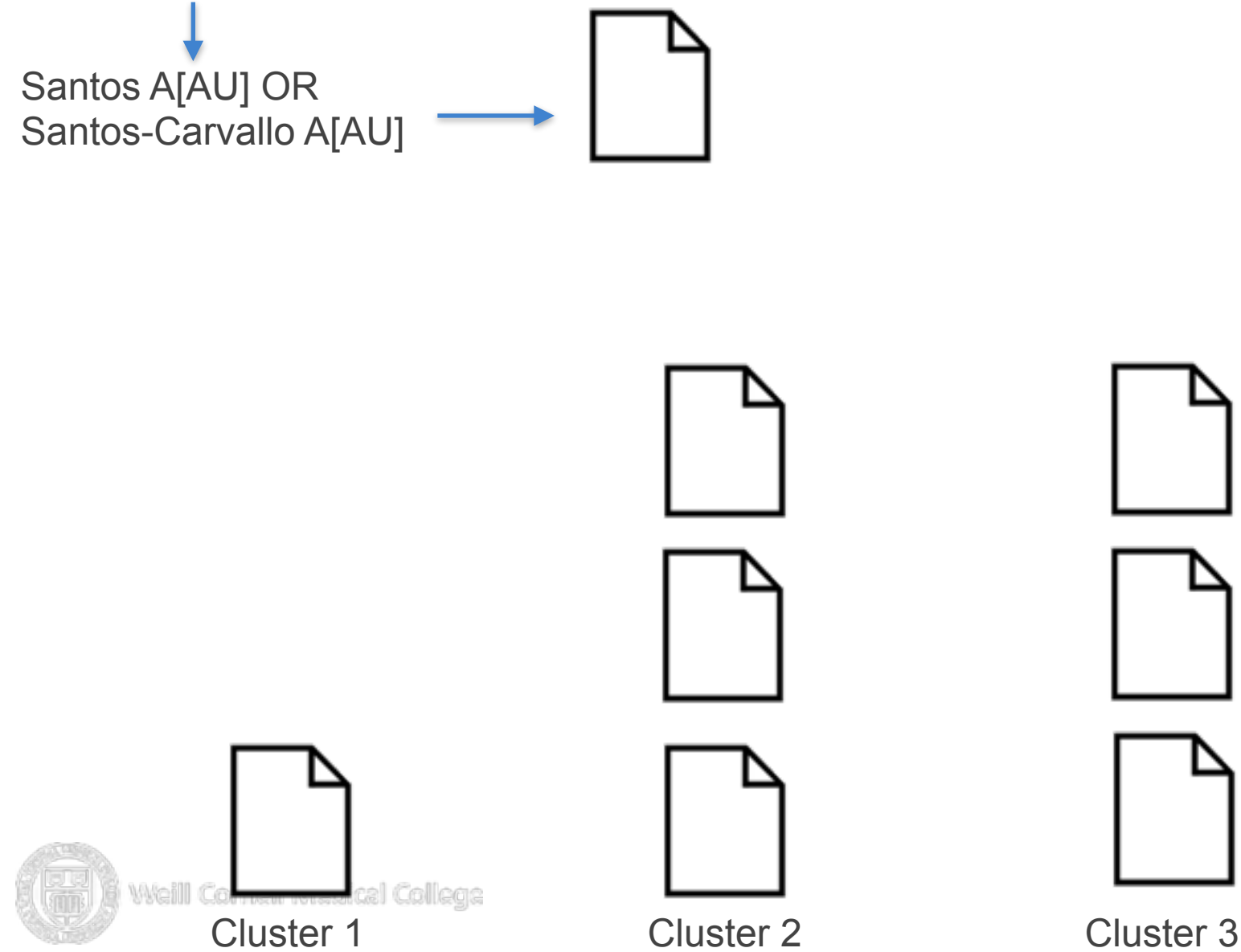

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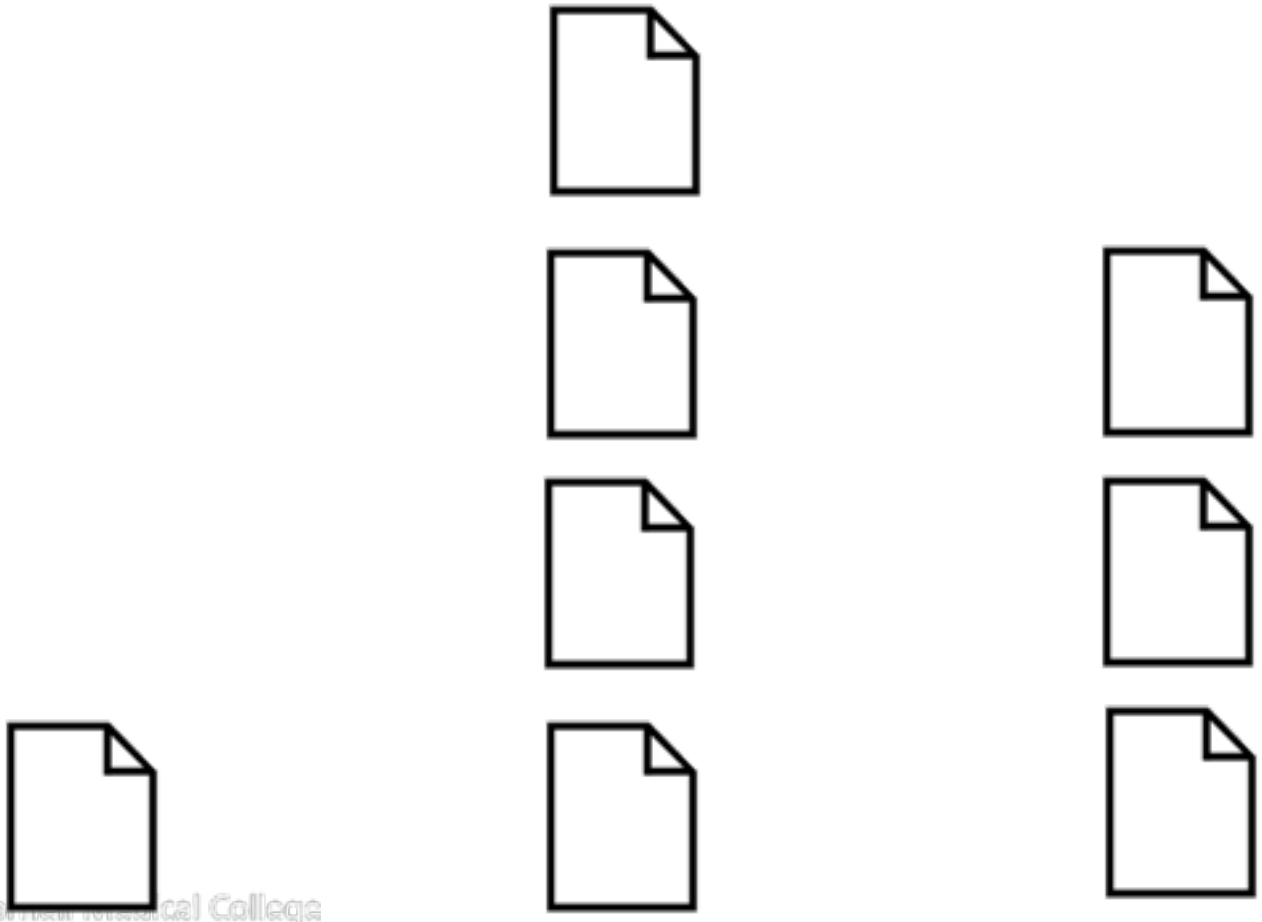

Cluster 1 Cluster 2 Cluster 3

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How ReCiter Works

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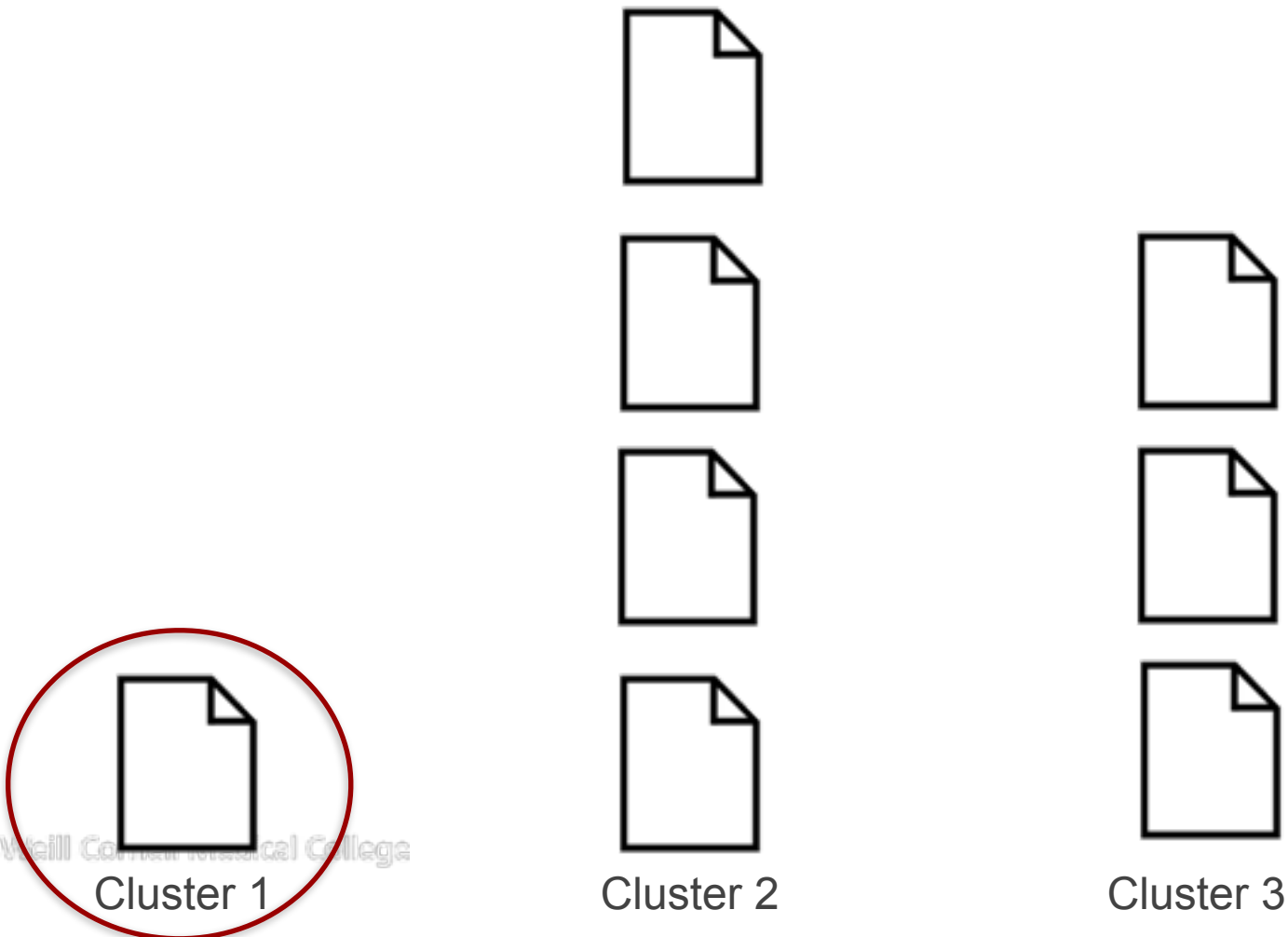

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Similarity Score: Board Certifications

Person: Jonathan W. Weinsaft

Board Certifications:
Cardiovascular Disease, Internal Medicine

Article cluster #1

- Duke Cardiovascular Magnetic Resonance Center
- Division of Cardiology, New York Methodist Hospital
- JACC. Cardiovascular Imaging

Article cluster #2

- Dept. of Ophthalmology, Mayo Clinic
- Dept. of Ophthalmology and Visual Sciences ...
- Cornea

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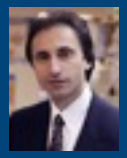
Similarity Score: Known Co-Investigators on Grants

Person: Shahin Rafii



Grant co-investigators:
Bi-Sen Ding, Zhongwei Cao

Article cluster #1 includes:

- Ding BS
- Cao Z
- Kao DI

Article cluster #2 includes:

- Kaira K
- Yasuda M
- Palefsky JM

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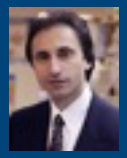

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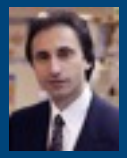
Similarity Score: Known Co-Investigators on Grants

Score = 0.45

Person: Shahin Rafii



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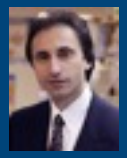

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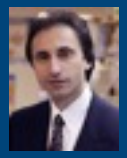

Grant co-investigators:
Bi-Sen Ding, Zhongwei Cao

Score = 0.45

Article cluster #1 includes:

- Ding BS
- Cao Z
- Kao DI

Score = 0.12

Article cluster #2 includes:

- Kaira K
- Yasuda M
- Palefsky JM

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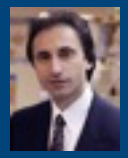
Similarity Score: Year of Terminal Degree

Person: Shahin Rafii



Year of terminal degree: 1986

Article cluster #1

1972

1977

1978

Article cluster #2

1988

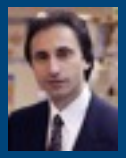
1990

1997

Weill Cornell Me

Similarity Score: Year of Terminal Degree

Person: Shahin Rafii



Year of terminal degree: 1986

Article cluster #1

- 1972
- 1977
- 1978

Article cluster #2

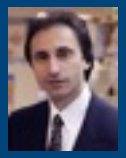
- 1988
- 1990
- 1997

Weill Cornell Me

Similarity Score: Year of Terminal Degree

Score = 0.04

Person: Shahin Rafii



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1977

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Article cluster #2

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1990

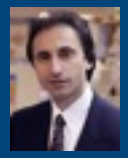
1997

Weill Cornell Me

Similarity Score: Year of Terminal Degree

Score = 0.04

Person: Shahin Rafii



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Similarity Score: Year of Terminal Degree

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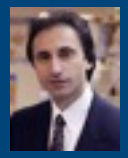

Year of terminal degree: 1986

Score = 0.04

Article cluster #1

- 1972
- 1977
- 1978

Score = 0.88

Article cluster #2

- 1988
- 1990
- 1997

wcmc-its / ReCiter PRIVATE

Unwatch 13 | Star 1 | Fork 0

ReCiter — Edit

287 commits | 3 branches | 0 releases | 4 contributors

Branch: master | ReCiter / +

issue #45 fix and implemented the JUnit test case

hanumanthaatgemini authored 2 days ago — latest commit f3647931f1

src	issue #45 fix and implemented the JUnit test case	2 days ago
.classpath	Added .classpath to git	2 months ago
.gitignore	Added test for empty afid in Scopus XML.	2 months ago
.project	Added .project.	3 months ago
README.md	Formatting change	20 days ago
data.7z	Adding data.7z	2 months ago
pom.xml	Updating CSV writer.	23 days ago

README.md

ReCiter

ReCiter wiki

The wiki includes descriptions of files used for computation, an overview of error analysis, a log of performance, and use cases, among other informational material on the project.

Code
Issues 59
Pull requests 0
Wiki
Pulse
Graphs
Settings

HTTPS clone URL
https://github.com/

You can clone with HTTPS, SSH, or Subversion.

Clone in Desktop
Download ZIP

This repository Search

Pull requests Issues Gist

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Unwatch 13

Issues Pull requests Labels Milestones

Filters is:issue is:open

59 Open 42 Closed

Author Labels Milestones Assigr

Look up known e-mail addresses in ReciTer database in phase two matching
Gemini Developer Phase Two Matching
#101 opened 13 days ago by michaelbales1 Achieve 92% accura...

For each of an author's aliases, modify initial query based on lexical rules
Gemini Developer Phase: Information Retrieval Phase: Preprocessing Priority
#100 opened 16 days ago by michaelbales1 Achieve 92% accura...

Read BoardCertificationsWCMC.xlsx from the database Gemini Developer Phase: Information Retrieval
#99 opened 21 days ago by michaelbales1 Ready for beta

Read DiscrepanciesYears.tab data from the database Gemini Developer Phase: Information Retrieval
#98 opened 21 days ago by michaelbales1 Ready for beta

Use citizenship and educational background to improve precision Gemini Developer Phase One Clustering
#97 opened on Jun 22 by michaelbales1 Achieve 92% accura...

This repository Search

Pull requests Issues Gist

wcmc-its / ReCiter PRIVATE

Unwatch 13

Issues Pull requests Labels Milestones

Filters is:issue is:open

59 Open 42 Closed

Author Labels Milestones Assigr

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Read DiscrepanciesYears.tab data from the database Gemini Developer Phase: Information Retrieval
#98 opened 21 days ago by michaelbales1 Ready for beta

Use citizenship and educational background to improve precision Gemini Developer Phase One Clustering
#97 opened on Jun 22 by michaelbales1 Achieve 92% accura...

Decrease likelihood of cluster assignment when co-author name is common On Hold Phase One Clustering
#96 opened on Jun 17 by michaelbales1 Achieve 92% accura...

Output a human-readable explanation for why a publication is matched to an individual
Error Analysis On Hold Phase: Output
#95 opened on May 26 by paulalbert1

Update ReCiter code so that aliases can be included as input Gemini Developer Phase: Information Retrieval
#93 opened on May 26 by paulalbert1 Achieve 92% accura...

Scope

Type	Count	Priority
Active faculty	5,500	High
Active students	1,000	High
Postdocs and fellows	400	Medium
Research and staff associates	800	Medium
Alumni	5,000	Medium
Non-WCMC faculty in Graduate School	< 100	Medium
Members of the CTSC including those from CU, MSKCC, NYP, Hunter	> 10,000	Low
Inactive/historical academics	> 10,000	Low

Next steps

- Machine learning
- Open source
- You can help

Java - ReCiterJ/src/test/java/reciter/algorithm/cluster/ReCiterExample.java - Eclipse - /Users/meb7002/google_drive/professional/dev

Quick Access | Java | Debug

Package Expl | JUnit

- art
- bales
- gensound
- harvester-github-1.6 [harvester-gith
- NewReCiter [ReCiter master ↓13]
  - src/main/java
  - src/main/resources
  - src/test/java
    - reciter.algorithm.cluster
      - ReCiterExample.java
      - ReCiterExampleSingleCwi
      - StanfordNLPExample.java
    - xmlparser.pubmed
    - xmlparser.scopus
  - src/test/resources
  - JRE System Library [JavaSE-1.8]
  - JUnit 4
  - Maven Dependencies
  - Referenced Libraries
  - src
  - target
  - data.7z
  - pom.xml
  - README.md
  - reciter.log
- ReCiterJ [ReCiterJ master ↓13]

ReCiterExample. | ReCiterClustere | Clusterer.java | Analysis.java

```
27      public static double totalRecall = 0;
28      public static int numCwids = 0;
29
30      public static void main(String[] args) throws IOException {
31
32          // Keep track of execution time of ReCiter .
33          long startTime = System.currentTimeMillis();
34
35          slf4jLogger.info("Number of cwids: " + numCwids);
36          slf4jLogger.info("Average Precision: " + totalPrecision / numCwids);
37          slf4jLogger.info("Average Recall: " + totalRecall / numCwids);
```

Problems | Javadoc | Declaration | Console | Error Log

<terminated> ReCiterExample (4) [Java Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/bin/java (A

reciter.algorithm.cluster.ReCiterExample.java - NewReCiter/src/test/java

Java - ReCiterJ/src/test/java/reciter/algorithm/cluster/ReCiterExample.java - Eclipse - /Users/meb7002/google_drive/professional/dev

Quick Access | Java | Debug

Package Expl | JUnit

- art
- bales
- gensound
- harvester-github-1.6 [harvester-gith
- NewReCiter [ReCiter master ↓13]
  - src/main/java
  - src/main/resources
  - src/test/java
    - reciter.algorithm.cluster
      - ReCiterExample.java
      - ReCiterExampleSingleCwi
      - StanfordNLPExample.java
    - xmlparser.pubmed
    - xmlparser.scopus
  - src/test/resources
  - JRE System Library [JavaSE-1.8]
  - JUnit 4
  - Maven Dependencies
  - Referenced Libraries
  - src
  - target
  - data.7z
  - pom.xml
  - README.md
  - reciter.log
- ReCiterJ [ReCiterJ master ↓13]

ReCiterExample. | ReCiterClustere | Clusterer.java | Analysis.java

```
27      public static double totalRecall = 0;
28      public static int numCwids = 0;
29
30      public static void main(String[] args) throws IOException {
31
32          // Keep track of execution time of ReCiter .
33          long startTime = System.currentTimeMillis();
34
35          slf4jLogger.info("Number of cwids: " + numCwids);
36          slf4jLogger.info("Average Precision: " + totalPrecision / numCwids);
37          slf4jLogger.info("Average Recall: " + totalRecall / numCwids);
```

Problems | Javadoc | Declaration | Console | Error Log

<terminated> ReCiterExample (4) [Java Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/bin/java (A

reciter.algorithm.cluster.ReCiterExample.java - NewReCiter/src/test/java

ReCiter Output (selected fields)

Article ID	Target author	Cluster	Articles in cluster	Cluster ultimately selected	Reference standard status
25313356	aas2004	1	4	No	True Negative
24605052	aas2004	1	4	No	True Negative
19389401	aas2004	1	4	No	True Negative
24767105	aas2004	1	4	No	True Negative
23332979	aas2004	2	2	Yes	False Positive
20489570	aas2004	2	2	Yes	True Positive

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