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Analysis of the Community of Learning Analytics

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PURDUE
UNIVERSITY



MOTIVATION

- Identify and discover the:
 - growth,
 - dynamics and
 - evolution patterns
- It can also be used to extract
 - solitary activities (research interests)
 - social activities (friends and collaborators)



Introduction

■ Following analysis will be presented:



People

- Author's collaboration
- Institutional collaboration
- Intercountry collaboration



Topics

- Keyword analysis
- Word co-occurrence analysis

Emphasis on Collaboration Patterns



NETWORK ANALYSIS TOOLS

- The analysis presented in the paper has been made using:

NodeX

L

Collaboration trends
Diversity
Author affiliation

Microsoft Excel add-on (Free)
Creates network visualization from worksheet containing edges list
Supported formats: Ucinet, GraphML, Pajek, Twitter, Flickr, Youtube

NetDra

W

Geographical location

A tool for drawing social networks (Free)
Supported data formats: Ucinet, Pajek
Allows reading multiple relations on the same nodes, and switch between them (or combine them) easily
Limitation: Windows platform

Many Eyes

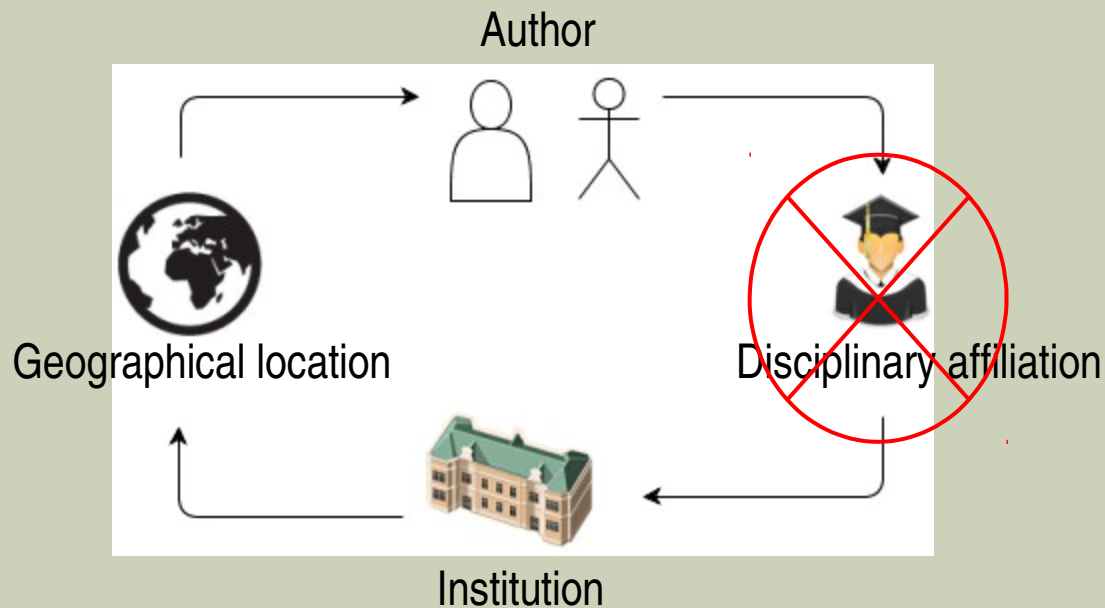
Geographical diversity
Keyword Analysis

Online **collaborative** visualization tool
Supports user datasets as well as host-supported datasets
Can be used as an easy to use educational tool for data comparisons



Research QUESTIONS: PEOPLE

- Author Analysis: How are the collaboration trends varying in learning analytics? Who is more active in creating and disseminating learning analytics knowledge?



How are the collaboration trends varying in learning analytics?

Author Pairs	Article Counts
S. Ventura, C. Romero	10
N.T. Heffernan , J.E. Beck, N.T. Heffernan , Z.A. Pardos	6
A. HersHKovitz, R. Nachmias S.M. Gowda, R.S.J.D. Baker	5
10	4
15	3
110	2
938	1
$1(10)+2(6)+2(5)+10(4)+15(3)+110(2)+938(1) = 1275$	



How are the collaboration trends varying in learning analytics?

■ Diversity:

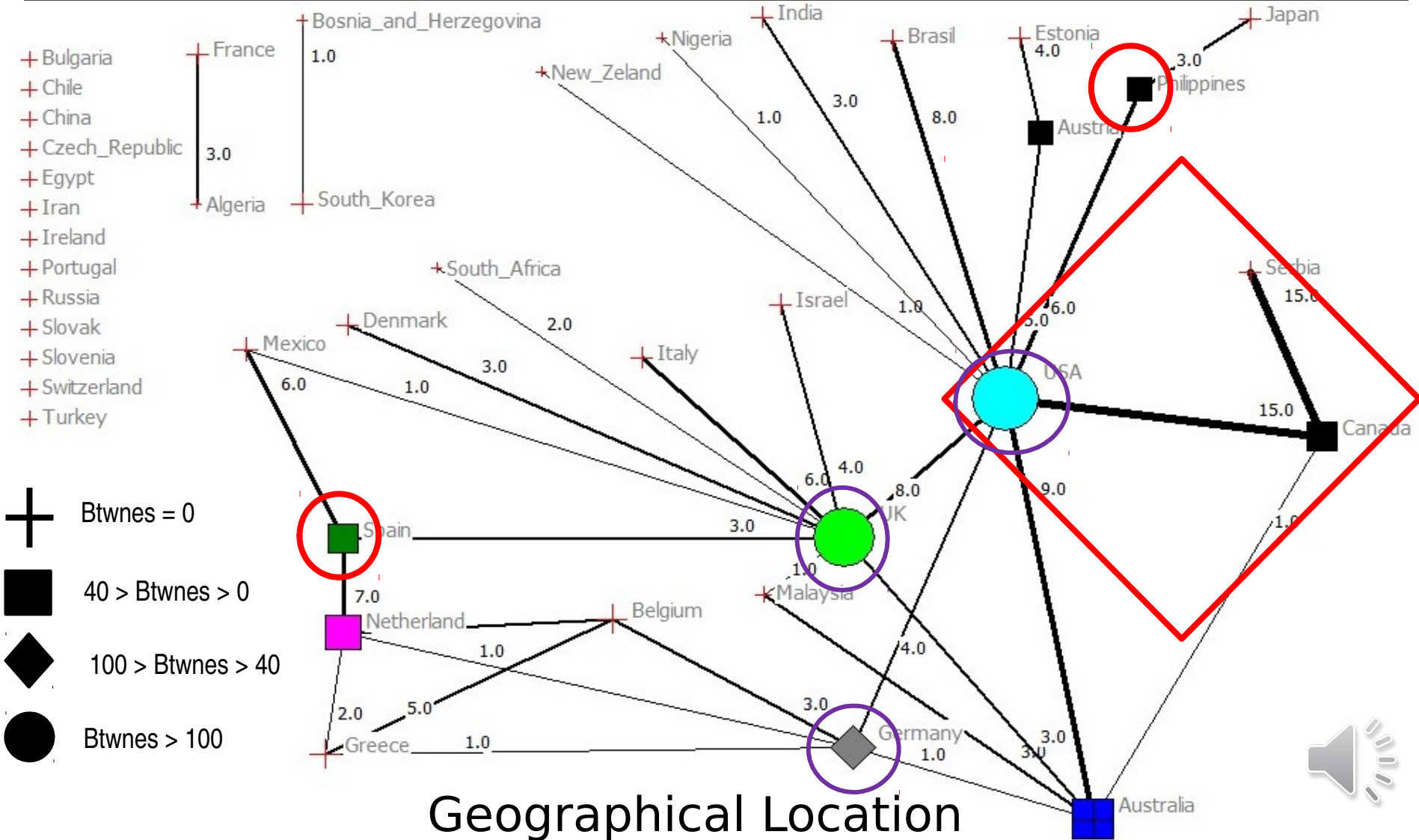
- Inclusion of different types of people,
- Count of distinct co-authors in research papers

Significance?

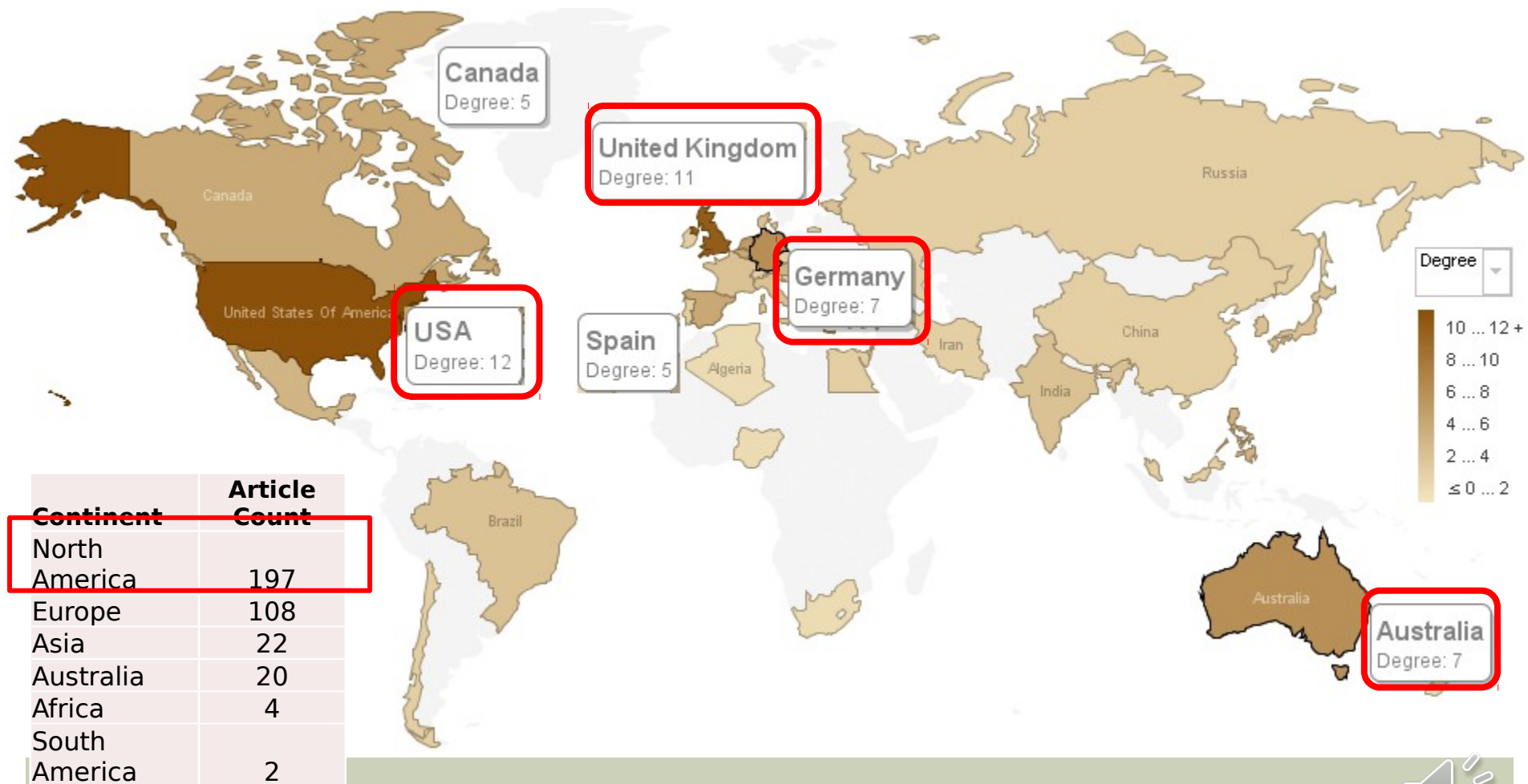
Author	Degree	Article Count
Kenneth R. Koedinger	34	17
→ Ryan S. J. d. Baker	25 ←	11
→ C. Romero	19 ←	11
Vincent Alevan	18	5
→ S. Ventura	17	11
→ Neil T. Heffernan	16	16
→ Sujith M. Gowda	15	5
Mykola Pechenizkiy	15	7
Arthur C. Graesser	14	4
Jack Mostow	13	12



Who is creating & disseminating Learning Analytics knowledge?



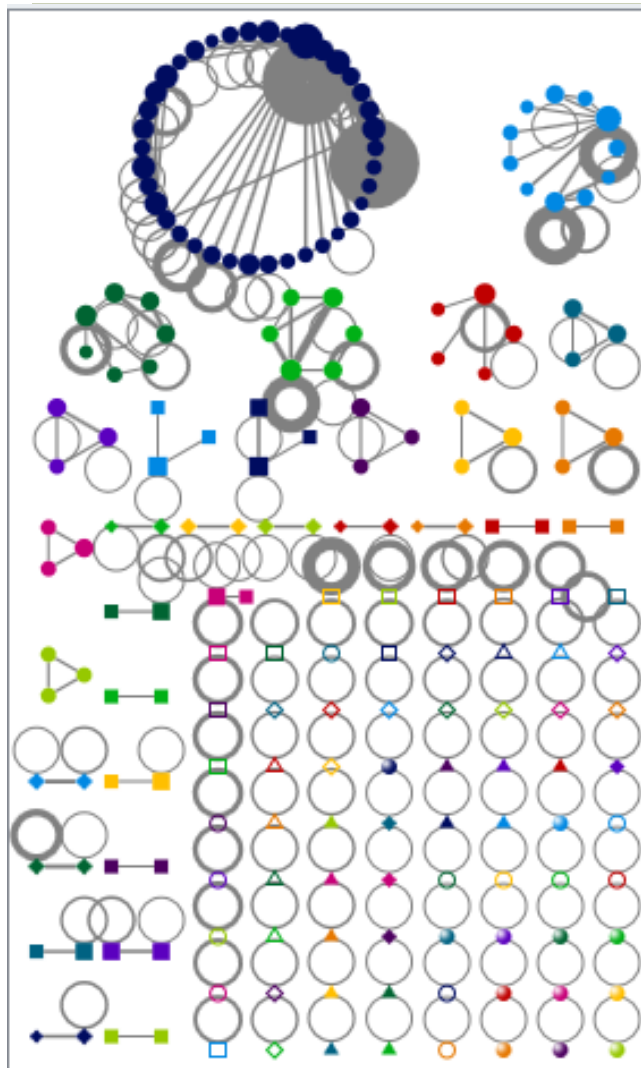
Who is creating & disseminating Learning Analytics knowledge?



Geographical Diversity of Collaborators



Who is creating & disseminating Learning Analytics knowledge?

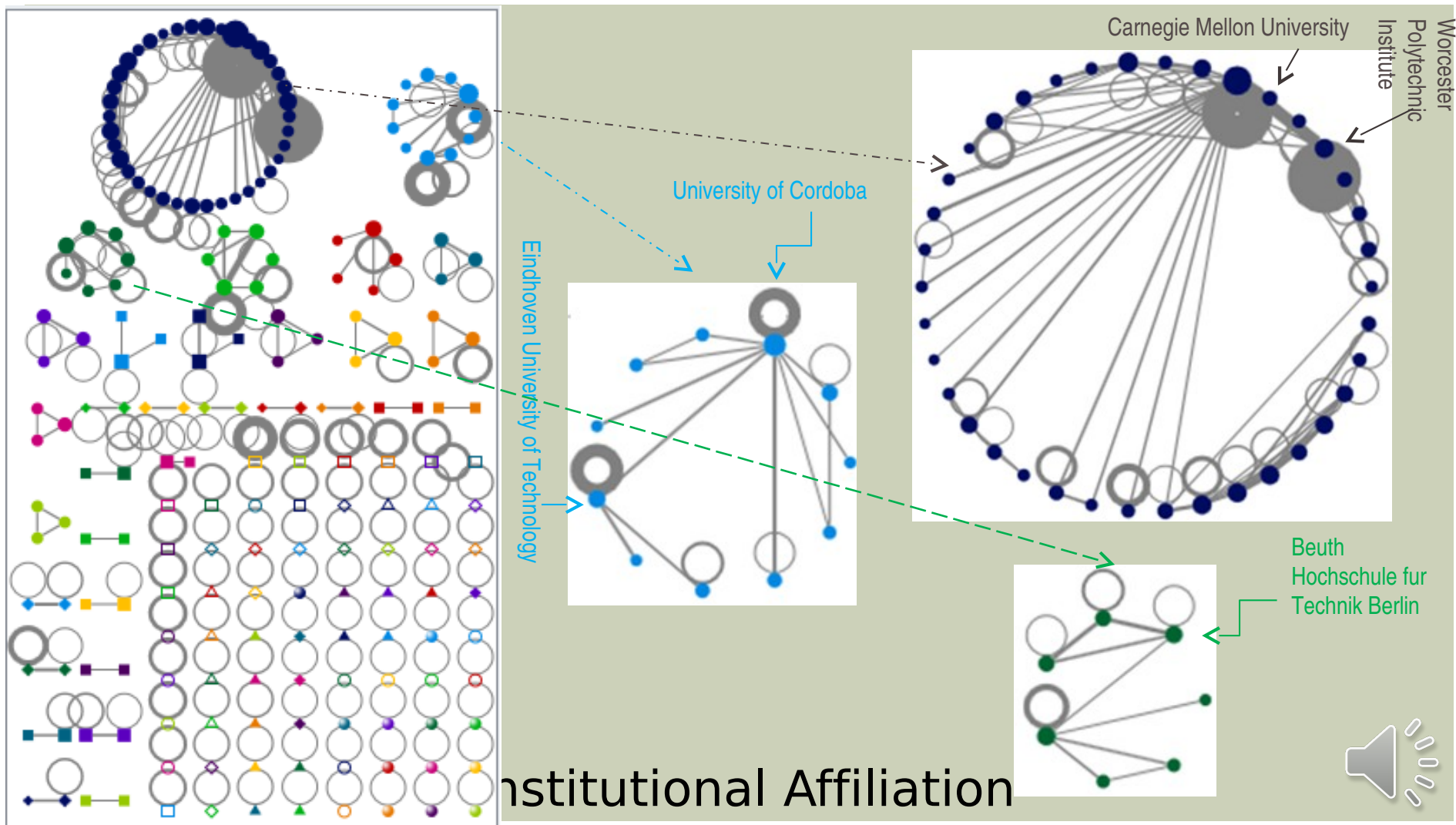


- Connected component □ separate group
- Nodes in each group □ different color and shape
- Smaller groups at the bottom
- Node size represents degree
- Edge □ straight line, loop
- Edge width depicts edge weight
- This graph when explored in further detail can enlighten about the main contributors / institutes. Therefore, the top 3 connected components of this figure are explored.

Institutional Affiliation



Who is creating & disseminating Learning Analytics knowledge?



Research QUESTIONS: TOPICS

- Research Topics: How learning analytics trends have evolved over time? Which topics have been explored and which topics are emerging?

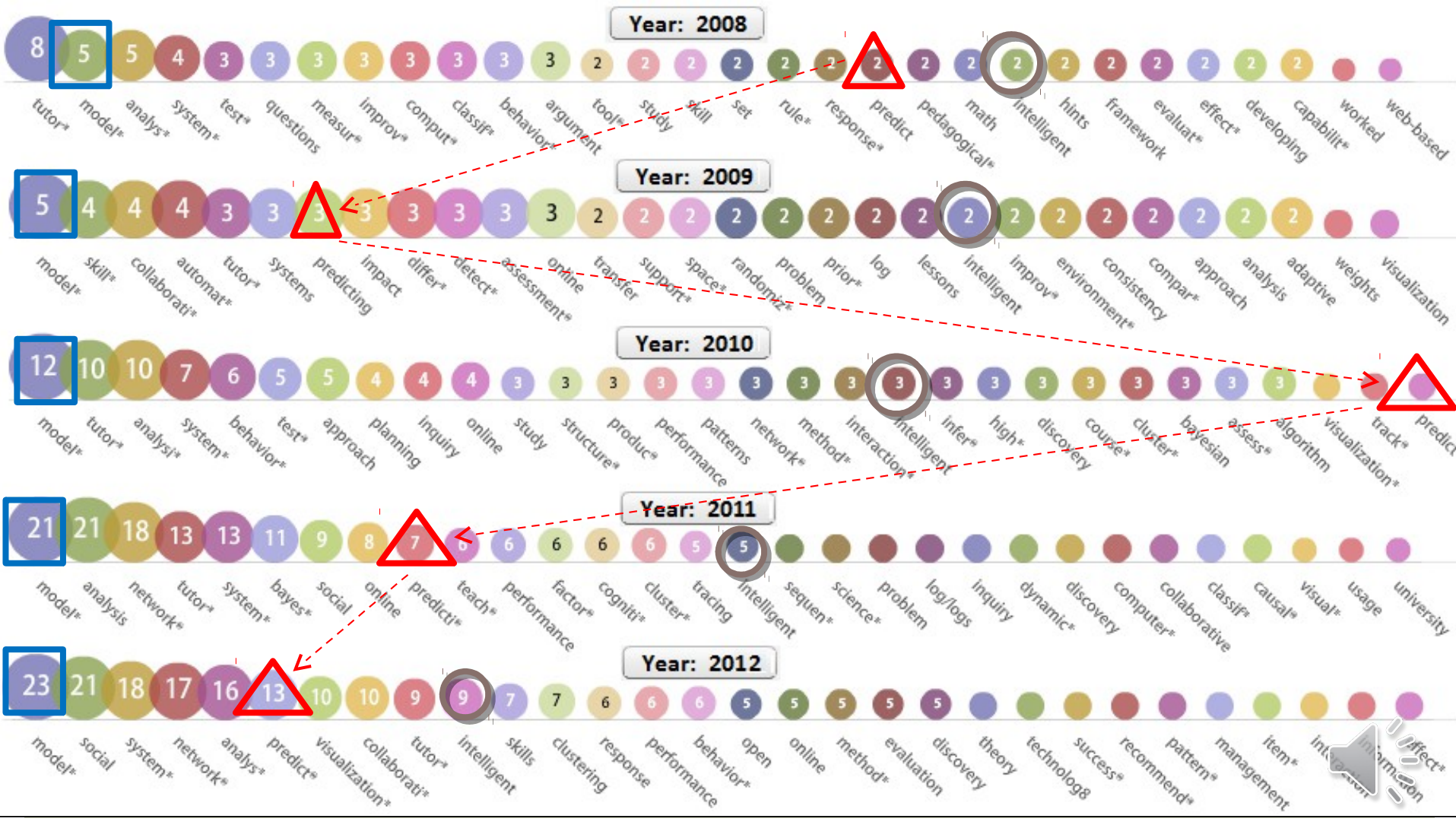


RESEARCH TOPICS: KEYWORD BASED ANALYSIS

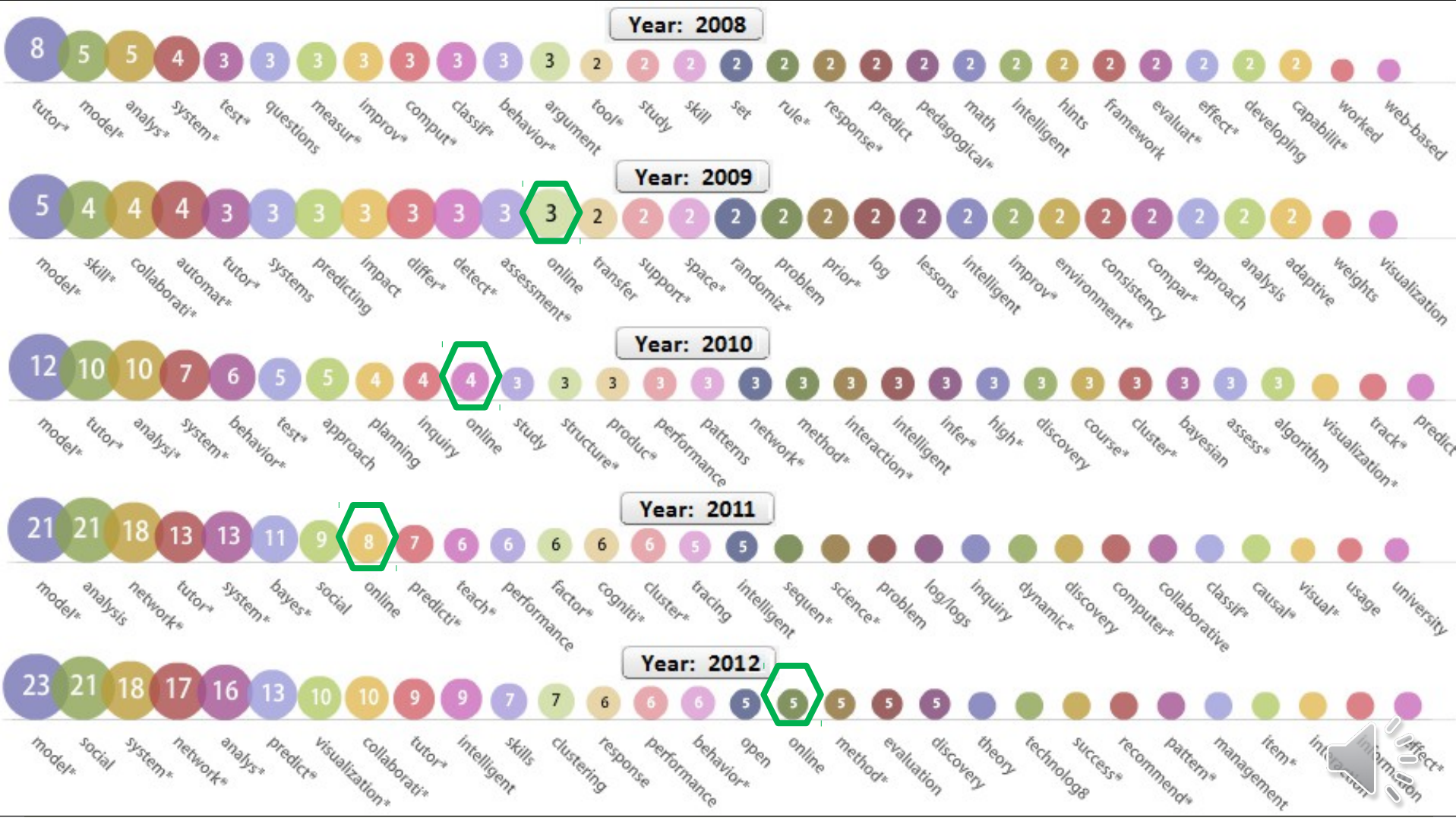
- Keyword (subject) field
- Title field for keyword extraction
- Top keywords extraction □
 - Hermetic Word Frequency Counter, stop word list, manual cleaning
- IBM's Many-eyes □ Matrix Chart



RESEARCH TOPICS: KEYWORD BASED ANALYSIS

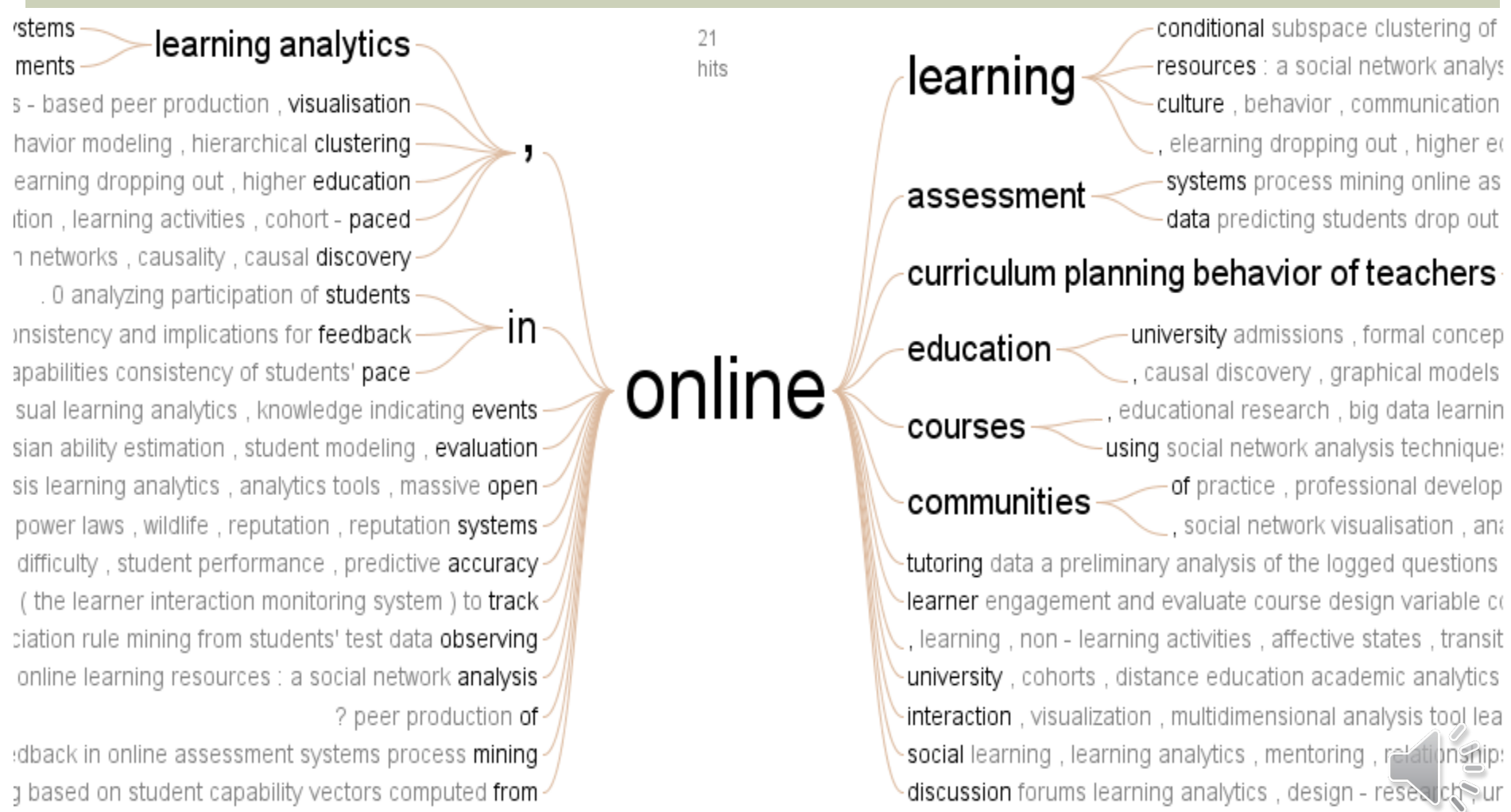


RESEARCH TOPICS: CONTEXT BASED ANALYSIS



RESEARCH TOPICS: CONTEXT BASED ANALYSIS

21 hits



SUMMARY

- Combined statistics for EDM, LAK and JETS from 2008-2012:

Graph Metric (social network analysis terminologies)	2008	2009	2010	2011	2012	Total
Total unique vertices / nodes (authors)	74	79	151	193	281	623
Unique edges (edge is loop for single author articles & straight line otherwise)	100	106	208	251	435	938
Edges with duplicates (i.e., edge weight is greater than 1) (These edges show joint authorship in more than one publication)	17	18	50	42	48	337
Total edges	117	124	258	293	483	1275
Self - loop (single author articles)	4	1	3	10	8	26
Multi - author article count	27	31	61	75	96	277
Connected components (authors forming a cluster based on authorship)	20	22	38	53	79	140
Single-vertex connected components (Count of the authors of single author articles who did not collaborate)	4	0	3	8	7	14
Maximum vertices in a connected component	15	7	15	29	22	113
Maximum edges in a connected component	33	16	36	72	76	370

conclusion

- Growth: Learning analytics exhibits an increasingly high degree of growth as evident from the overall increasing trend of publications, venues (of publications) and authors.
- Diversity and Collaboration: Co-authorship analysis reveals that authors from different institutes and countries are actively contributing towards this emerging research area.
- Research Topics: A keyword based study for tracking the research themes by the learning analytics community was presented.

