

Ontology Learning to Analyze Research Trends in Learning Analytics Publications

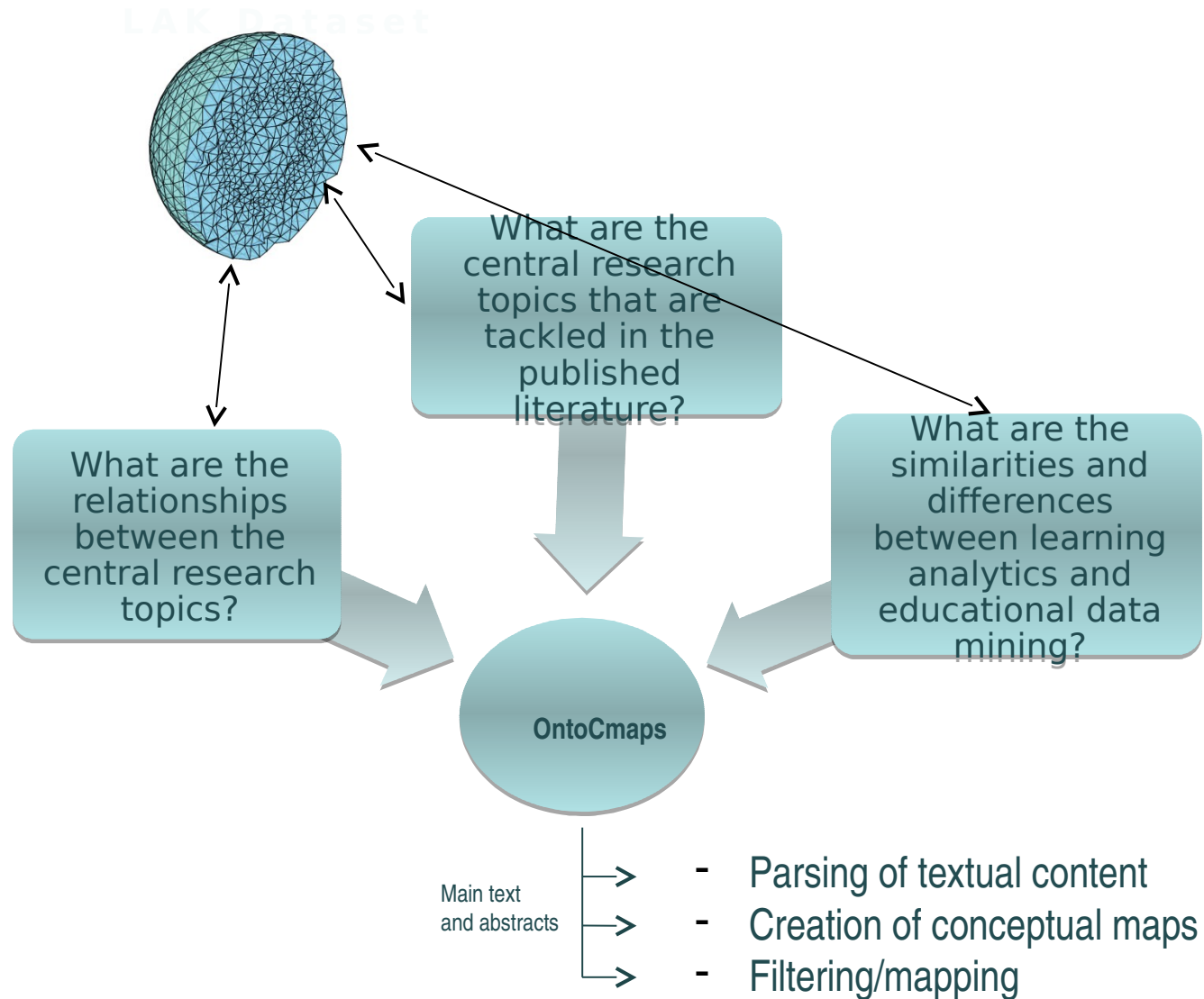
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Introduction

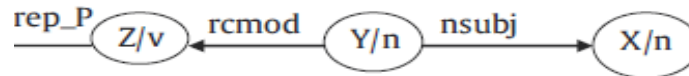


Data analysis (OntoCmaps)

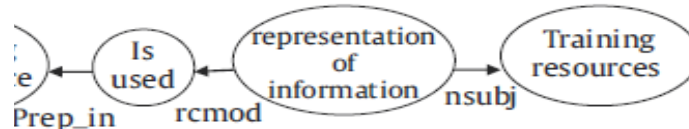
- Relies on our ontology learning tool
- Ontology learning from text is a multi-layer knowledge extraction task that targets the following components:
 - Terms and concepts
 - Taxonomy
 - Conceptual relationships
 - Axioms

Data analysis (~~Main~~ OntoCmaps) phases

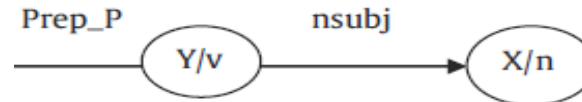
- The Extraction Phase
 - Stanford Parser: dependency module and POS Tagger
 - Deep semantic analysis based on dependency patterns



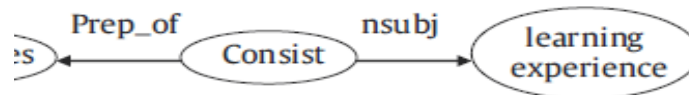
actions:
 and creates a new link Z_P Create predicate $Z_P(X, K)$



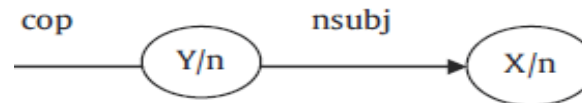
analysis:
 (training resource, learning experience)



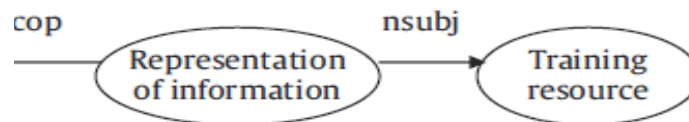
actions:
 and creates a new link Y_P
 Create $Y_P(X, K)$



analysis:
 (learning experience, activities)



actions:
 Create $K(X, Y)$



analysis:
 (training resource, representation of information)

Data analysis (Main phases)

- The Extraction Phase
 - Stanford Parser: dependency module and POS Tagger
 - Deep semantic analysis based on dependency patterns
- The Integration Phase
 - Concept maps
 - Lemmatization
 - Synonym detection
 - Co-reference resolution

Data analysis (~~Main~~ OntoCmaps) phases

- The Extraction Phase
 - Stanford Parser: dependency module and POS Tagger
 - Deep semantic analysis based on dependency patterns
- The Integration Phase
 - Concept maps
 - Lemmatization
 - Synonym detection
 - Co-reference resolution
- The Filtering Phase
 - Concept Filtering
 - Relationship Filtering

Metrics (Graph theory)

- Degree centrality
- Betweenness centrality
- HITS
- PageRank

Voting schemes

- Majority
- Borda Count
- Nauru

More info:

<http://lakchallenge.co.nf>

Findings

- Top ranked relationships: the majority voting scheme

LAK (abstracts)	LAK (paper body)	EDM (abstracts)	EDM (paper body)
student (0.50)	student (0.75)	student (0.75)	student (0.75)
datum (0.45)	datum (0.20)	model (0.38)	model (0.23)
informal_learn (0.31)	learner (0.15)	datum (0.37)	datum (0.19)
learn (0.31)	course (0.15)	method (0.19)	skill (0.09)
teacher (0.29)	analysis (0.12)	paper (0.16)	problem (0.08)
model (0.27)	activity (0.11)	system (0.13)	result (0.06)
learning_analytics (0.26)	user (0.10)	result (0.12)	method (0.06)
learner (0.25)	tool (0.10)	approach (0.11)	parameter (0.05)
social_factor (0.21)	learn (0.09)	skill (0.08)	question (0.05)
social_learn (0.19)	analytics (0.07)	analysis (0.07)	performance (0.05)
effective_learn (0.19)	group (0.07)	intelligent_tutoring_ system(0.07)	system (0.05)
group_learn (0.17)	system (0.07)	behavior (0.07)	approach (0.04)
knowledge_ professional (0.17)	teacher (0.06)	tool (0.07)	example (0.04)
Lak (0.17)	instructor (0.06)	work (0.06)	feature (0.04)

Findings

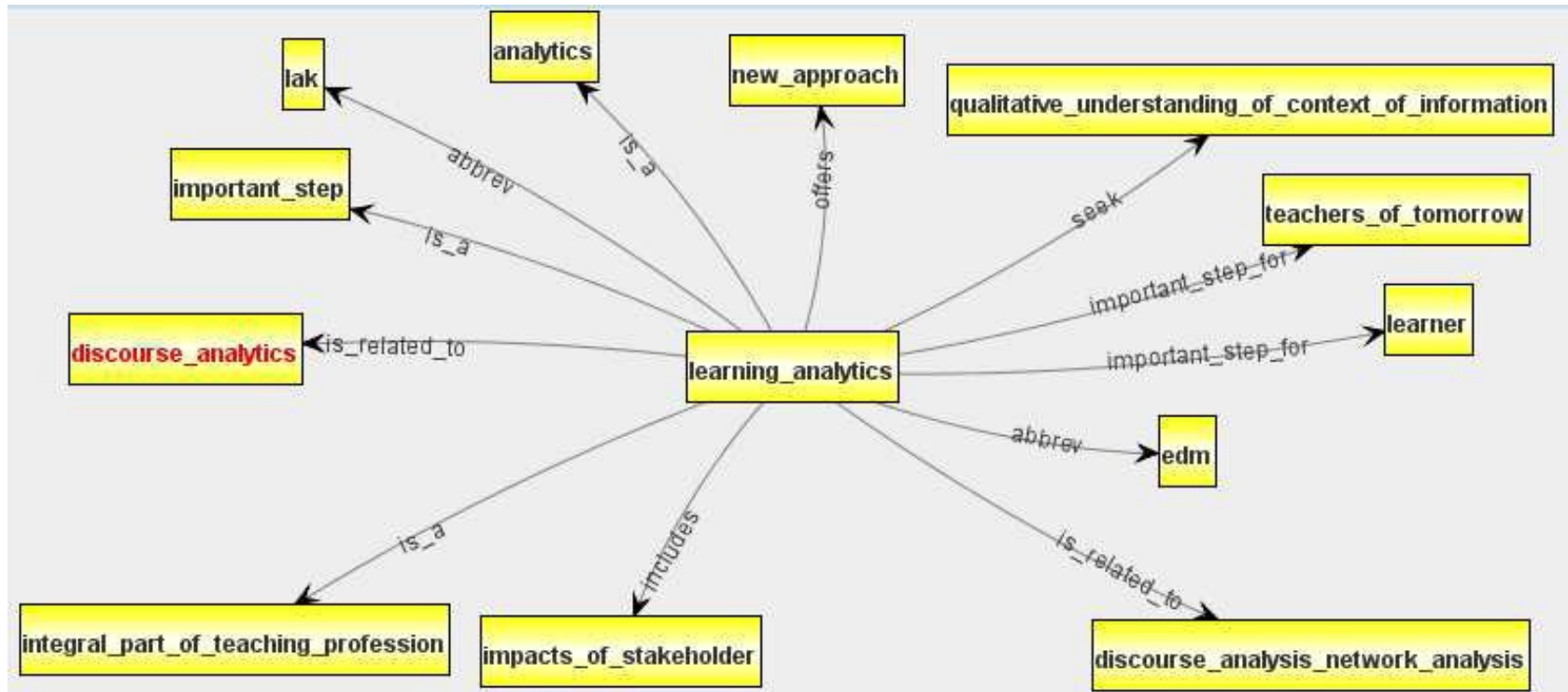
- Top ranked relationships: the majority voting scheme

LAK (abstracts)	LAK (paper body)	EDM (abstracts)	EDM (paper body)
learner-build-knowledge (1)	course-being recorded as well as to-student (1)	datum-mining-method (1)	model-fit-student (1)
datum-obtained from-learner (0.81)	datum-break ability to educate effectively-student (0.60)	method-linguistics in-paper (0.95)	datum-are collected far from-student (0.96)
learning_analytics-important step for-teachers_of_tomorrow (0.78)	system-addresses individually-student (0.45)	model-are trained over-datum (0.70)	skill-will have been covered by-student (0.67)
teachers_of_tomorrow-is a-teacher (0.77)	analysis-have since been moved as-student (0.37)	system-provides-student (0.61)	problem-assign for-student (0.67)
tool-incorporate functionality to access-datum (0.65)	network-impacting-student (0.31)	student-are represented by-model (0.56)	example-parameterization by-student (0.63)
model-can be used to inform-student (0.64)	process-finally should promote reflection on-instructor (0.29)	model-can detect-student (0.50)	question-were based-student (0.62)
datum-obtained from-instructor (0.62)	tool-identify-student (0.27)	datum-derived from-student (0.43)	student-provides useful evidence to-model (0.60)
learner-generating-datum (0.58)	datum-may be presented to-learner (0.25)	goal-has been investigated by-researcher (0.42)	step-requires-student (0.57)
student-accessing-online_discussion_forum (0.56)	activity-conducted by-user (0.25)	tutoring_system-is a-system (0.40)	performance-dependent upon-student (0.56)
model-can be used to inform-teacher (0.51)	group-will contain-student (0.25)	student-study with-intelligent_tutoring_system(0.39)	accuracy-varies across-student (0.48)
student-flock to-online_service (0.48)	environment-capture-datum (0.24)	skill-studied in-tutoring_system (0.38)	student-is guessing-result (0.48)
datum-are combined to calculate-likelihood_of_student (0.45)	model-highly accurate on-student (0.22)	intelligent_tutoring_system-are informed by-datum (0.32)	student-collect-datum (0.45)

Findings

- LAK papers
 - Focused on
 - Teachers/instructors
 - Informal learning
 - Social, networked and group learning
 - Promoting reflection of both students and instructors
- EDM papers
 - Focused on
 - Data mining (methods and approaches)
 - Intelligent tutoring systems
 - Feature extraction
 - Various types of parameters
 - Revealing unexpected patterns

Findings



Conclusion

- (dis)similarities between LAK and EDM research areas
- Potential of this type of analytics
- More interesting results at <http://lakchallenge.co.nf>

More info:
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