

Automated Evaluation of Comments in a MOOC Discussion Forum

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Motivation



Image: Grumpy MOOC cat/ Ryan Tracey, cc-by-nc-nd, © 2014

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in a MOOC Discussion Forum

Motivation

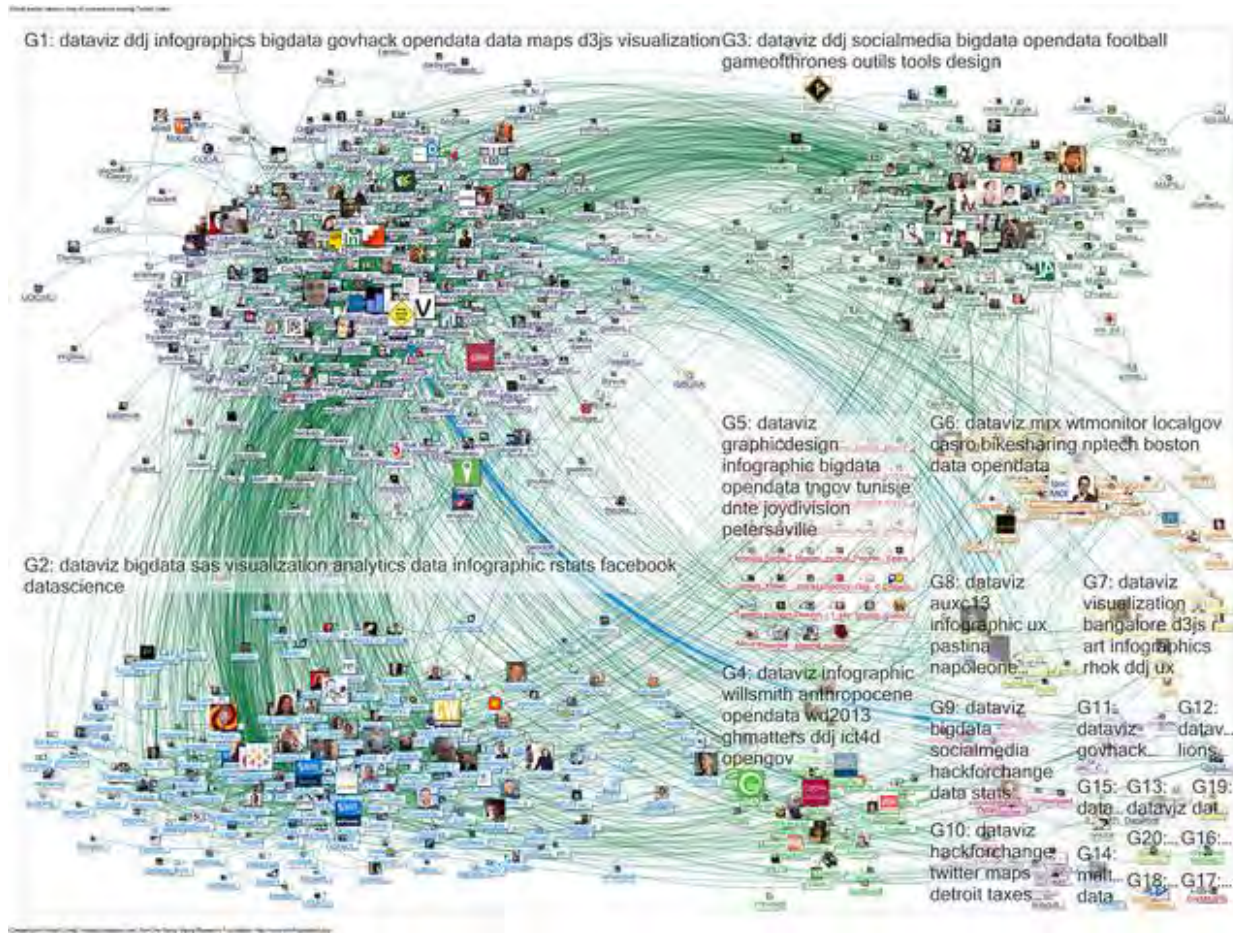


Image: NodeXL Twitter Search #dataviz/ Marc Smith, cc-by, © 2013

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Content analysis



Image: ALTC2015, Association for Learning Technology ©2015, CC BY-NC-SA 2.0

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Critical thinking

”...**reasonable** and reflective thinking that is focused upon deciding what to do or believe.”

Content Analysis Methods

Method	Categories						
Bloom's Taxonomy	0 Off-topic	1 Remember	2 Understand	3 Apply	4 Analyse	5 Evaluate	6 Create
Cognitive Presence (CoI)	0 Off-topic	1 Triggering	2 Exploration	3 Integration	4 Resolution		

D. R. Krathwohl, "A Revision of Bloom's Taxonomy: An Overview," *Theory Pract.*, vol. 41, no. 4, pp. 212–218, 2002.

D. R. Garrison, T. Anderson, and W. Archer, "Critical thinking, cognitive presence, and computer conferencing in distance education," *Am. J. Distance Educ.*, vol. 15, no. 1, pp. 7–23, 2001.

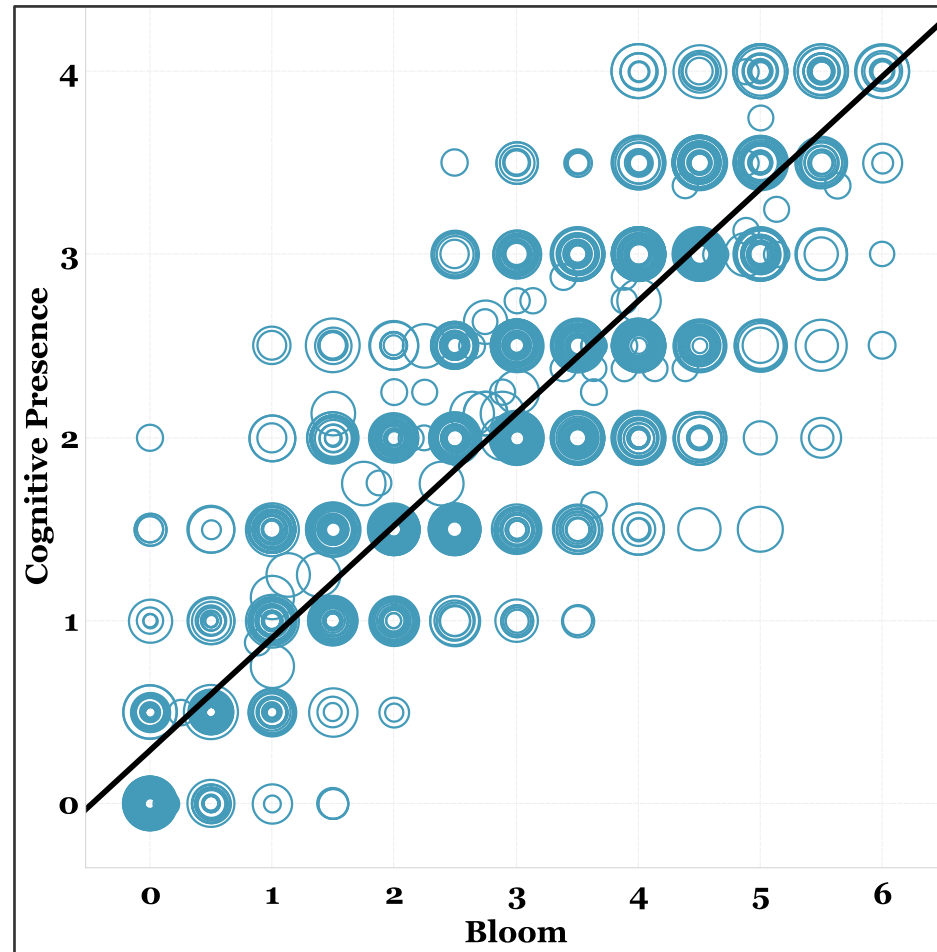
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- 500 comments each MOOC
- Rated according to 2 methods by 7 raters
- Linguistic Inquiry and Word Count (LIWC 2015)

Results

$r = 0.909$
 $p = <0.001$

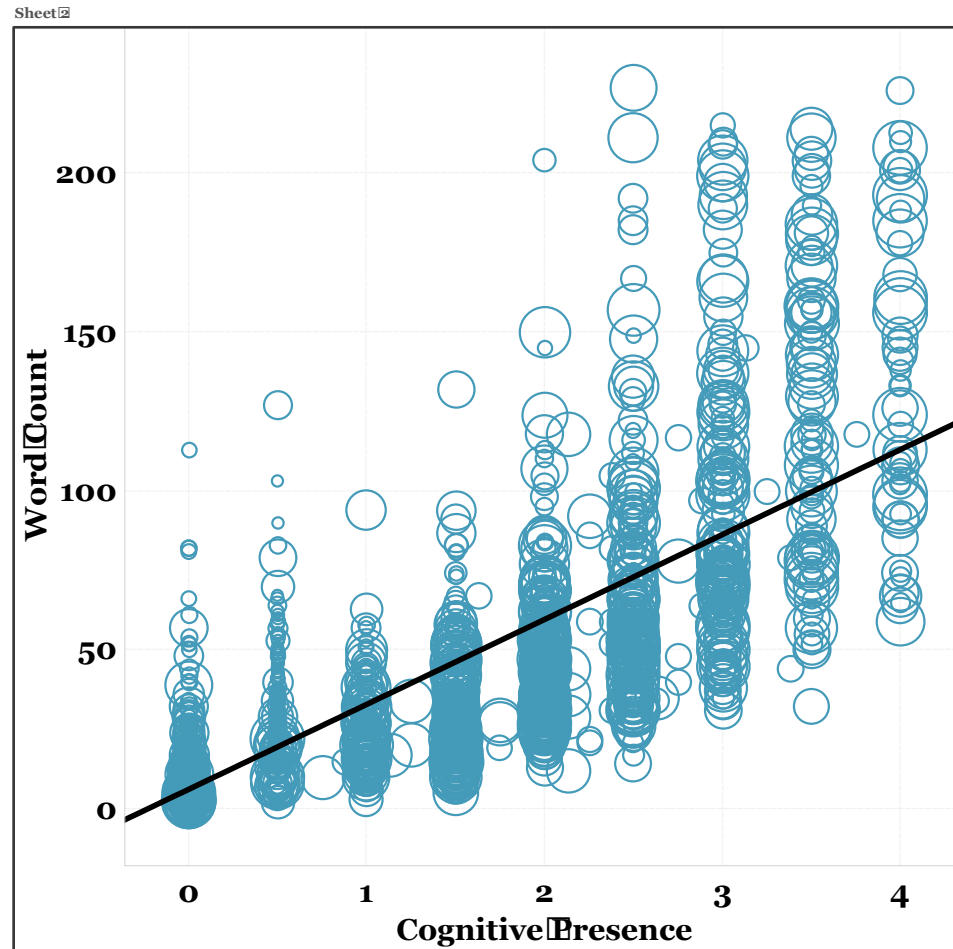


Correlation between Bloom and Cognitive Presence

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Results

$r = 0.704$
 $p = <0.001$

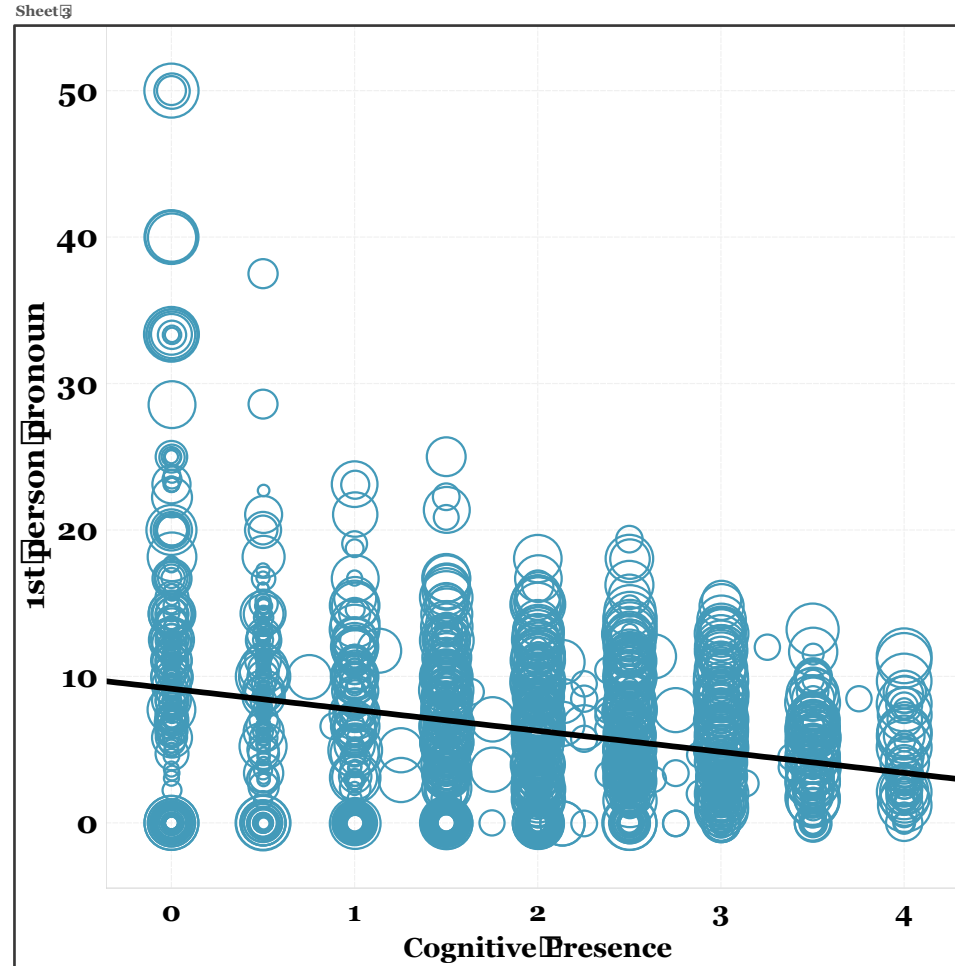


Correlation between CP and Word Count

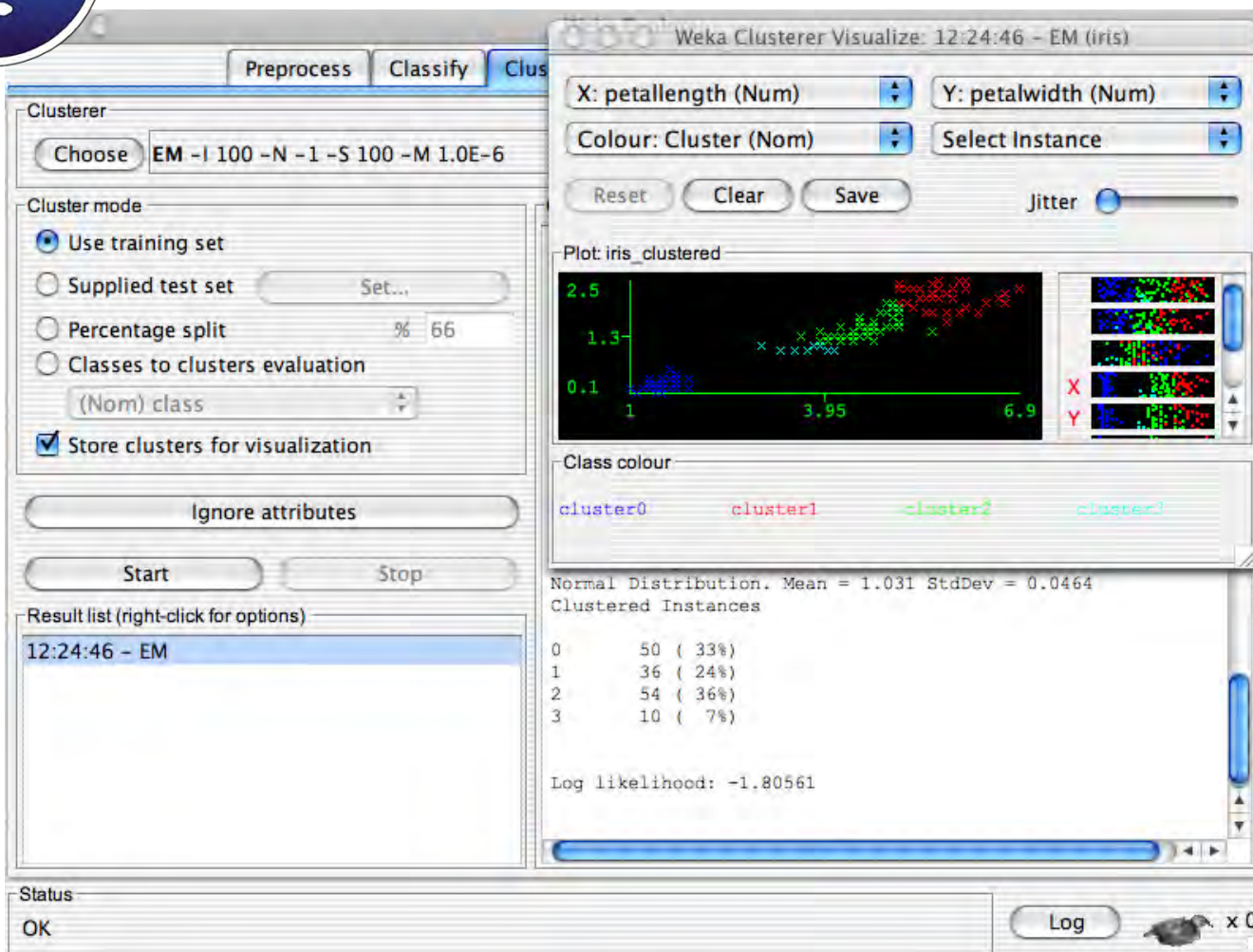
Results

$$r = -0.317$$

$$p = <0.001$$



Correlation between CP and 1st person singular



Machine Learning – CP

- Classifiers: Naive Bayes, J48, ZeroR, **Random Forest**
- 13 attributes:
word count, WPS, Sixltr, ppron, auxverb, conj, posemo, negemo, cogproc, cause, differ, affiliation, power
- <50 word comments
- Accuracy: 69%
- Cohen's k: 0.612

Machine Learning – CP

	Predicted				
Actual	Off-topic	Triggering	Exploration	Integration	Resolution
Off-topic	60	0	0	0	0
Triggering	0	58	0	0	12
Exploration	3	9	28	11	8
Integration	1	3	15	23	19
Resolution	1	2	5	14	38

Confusion matrix for best model – Cognitive presence

User study



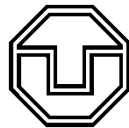
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User study

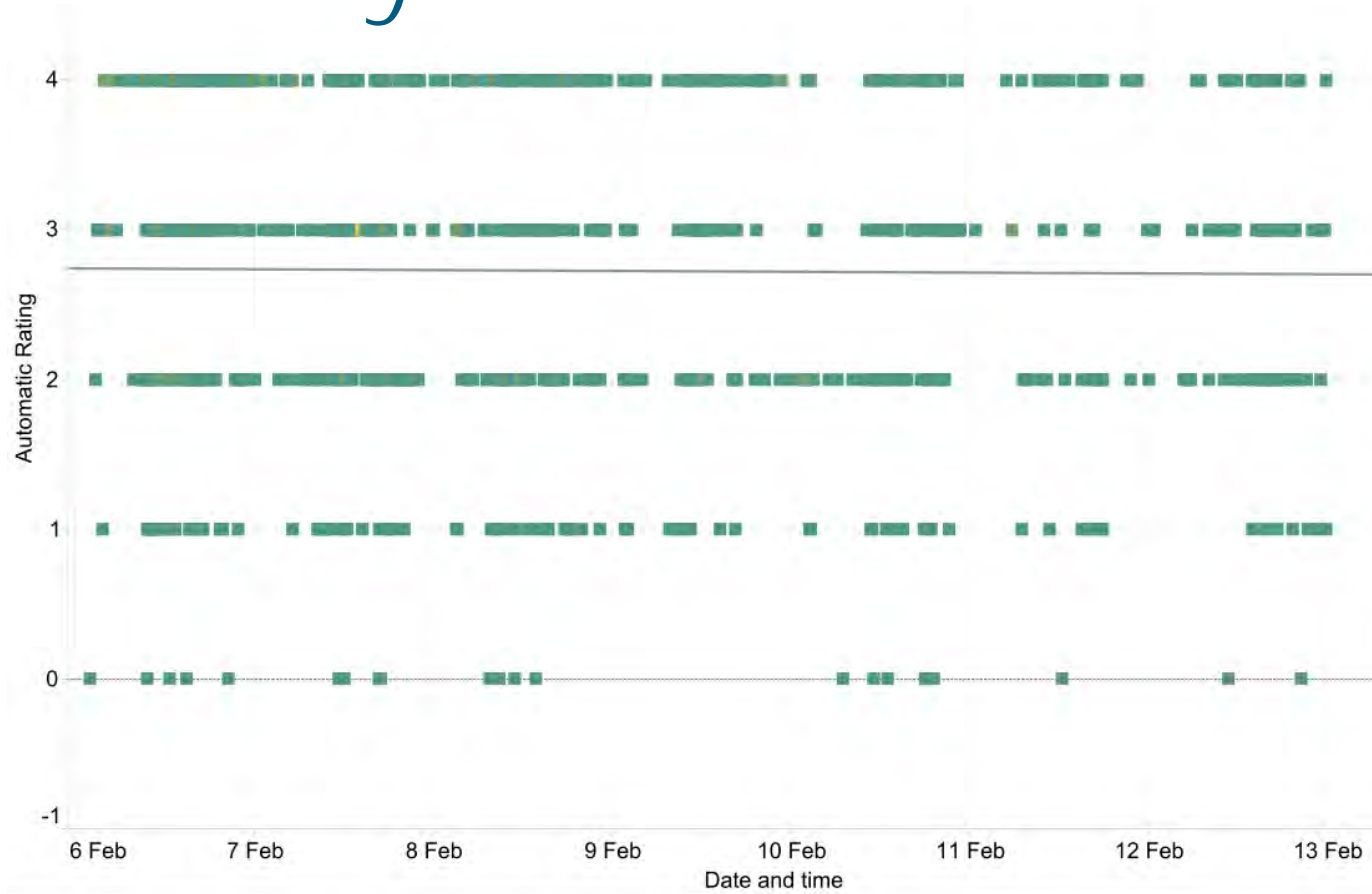


Image: Automatic rating of all comments in all steps for Week 1, DA MOOC, 2017.

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User study

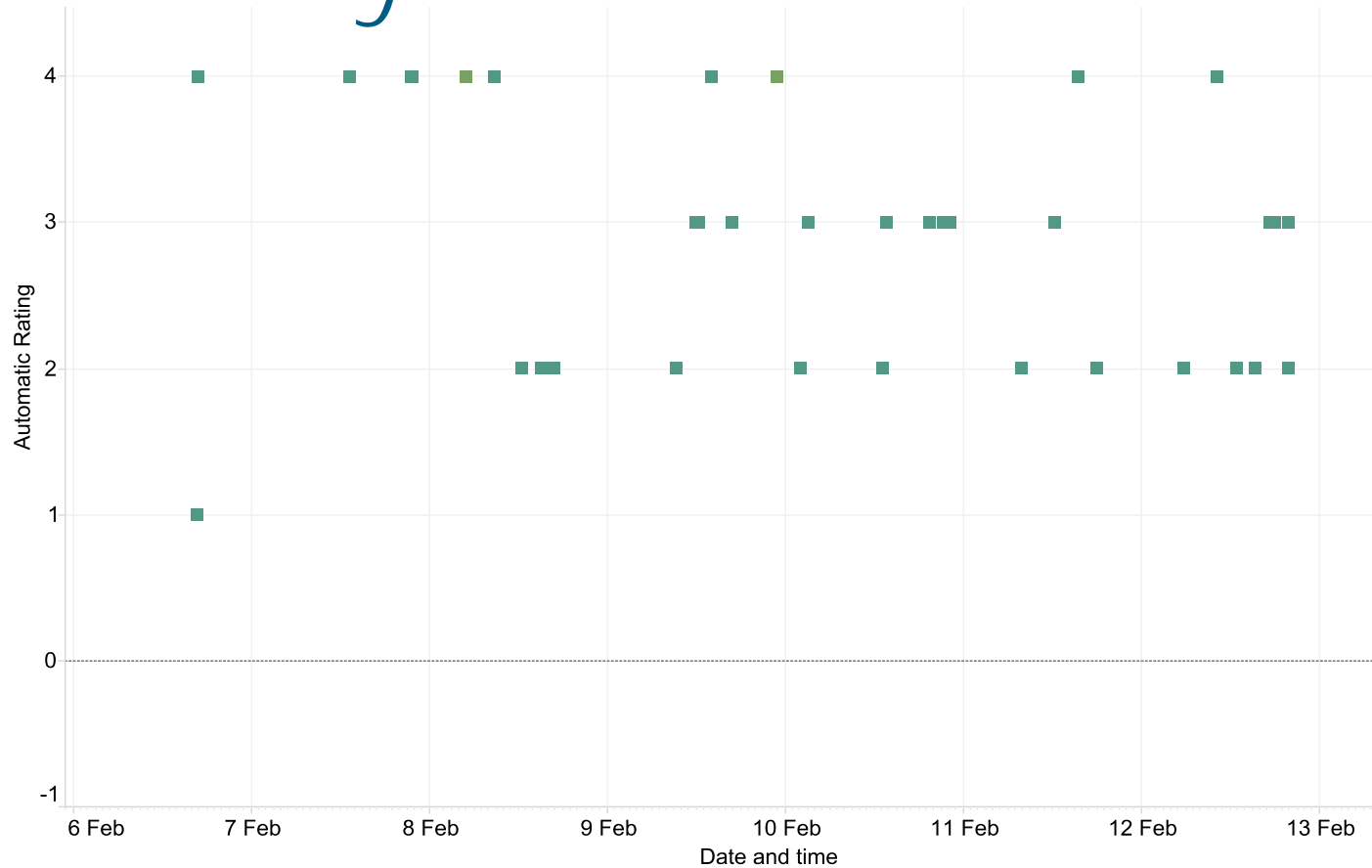


Image: Automatic rating of all comments in all steps for Week 1.18, DA MOOC, 2017.

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User study

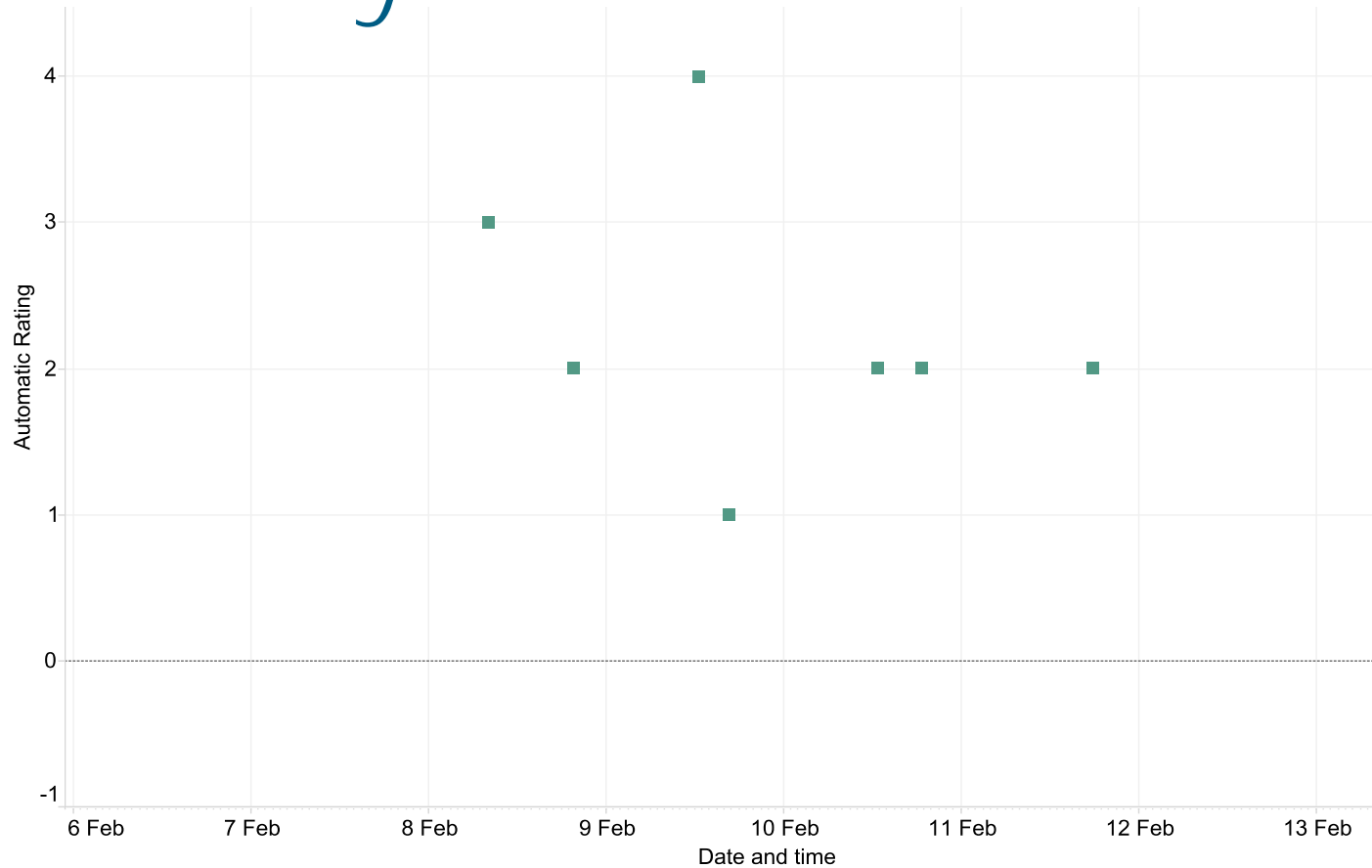


Image: Automatic rating of all comments in all steps for Week 1.17, DA MOOC, 2017.

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Initial outcomes

- Questioning importance of monitoring critical thinking
- But...seek reflective, high level comments
- Automatic ratings considered reasonably accurate
- Value feedback that facilitates filtering high volumes

Is critical thinking important?

“I found that it kind of focused on critical thinking, which I hadn’t really thought about. And what would be interesting would be to, when you’re designing the course to be thinking in those terms. I suppose when you’re designing a course you’re looking at the getting material across and doing the job or whatever, but you’re not thinking critical thinking as a way of engagement. You’re more worried about what the research says about MOOCs.”

Is critical thinking important?

“...in a course like this where it is largely, I suppose partly informative...and partly designed about quick takeaway, I think it might be a secondary concern...”

Is critical thinking important?

“...depends on to what level of critical thinking you’re trying to establish, but you need to have ... some sort of element to show where the learner’s got to.”

Seek reflective comments

“I am actually looking for comments which are reflective in a sense and maybe come up with extra information but also maybe ask questions... these are the best to show that they have learned something.”

Value of automatic rating

“I think actually it was about right; it was enough to kind of get a feel for what was going on and particularly for the visualisation, to actually see it was excellent, it was really helpful.”

Filtering comments

“MOOC’s are always a challenge to be able to look at...even if it’s not critical thinking you would like to look at the comments in a more efficient way... It will save time and it will give a highlight to things that are important.”

Next steps

- Reduce number of categories
- Explore method to include <50 word comments
- Develop a real time application

Thank you...

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