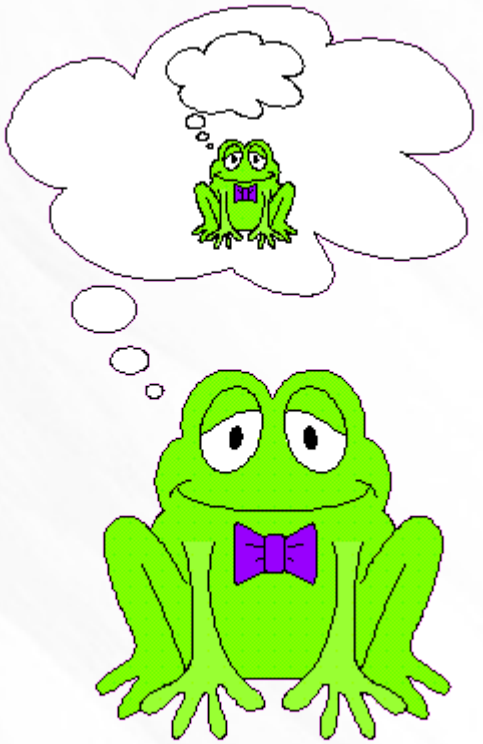
Meta-cognition evaluation

Maruseac Mihai
Neață Sofia

https://github.com/mihaimaruseac/nlp

Metacognition

- Thinking about knowing
- Learning about thinking
- Control of learning



Metacognition Evaluation :: Plan

- set of student works
- measure the similarity between it and initial text

- Criteria:
  - lexical similarity based on lexical chains
  - semantic similarity (LSA, LDA)
  - cue phrases

Metacognition Evaluation :: Done

- IMDB movie synopsis and reviews
- measure the similarity between reviews and synopsis
- prevent spoilers, increase quality of reviews

Procedure

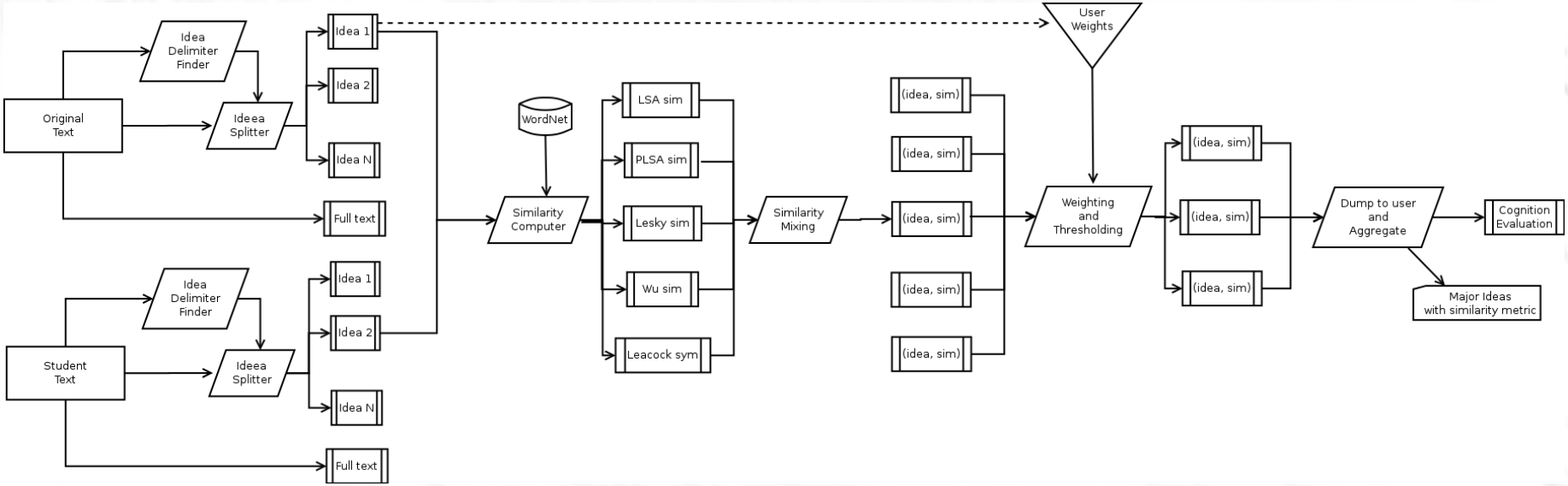
- Cue phrases => Main ideas
- LSA/PLSA/DSA + Lexical Chains
  - Higher dimensional vector of words
- Same treatment for original
  - Or presplit and precomputed

Evaluation

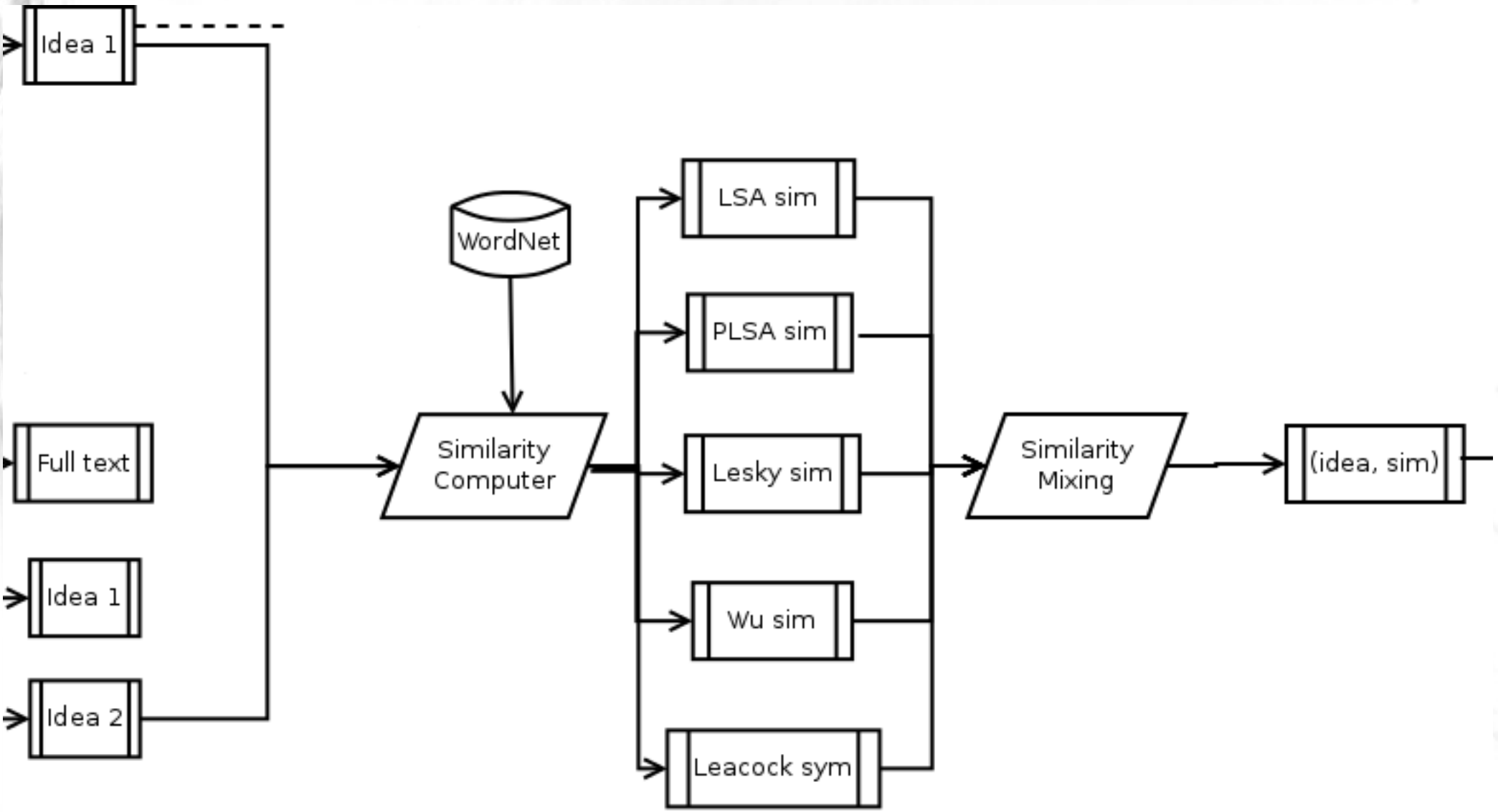
- For each idea: cosine similarity
- Average over all ideas with weights depending on idea's importance
- Score is given by this mean

Overview

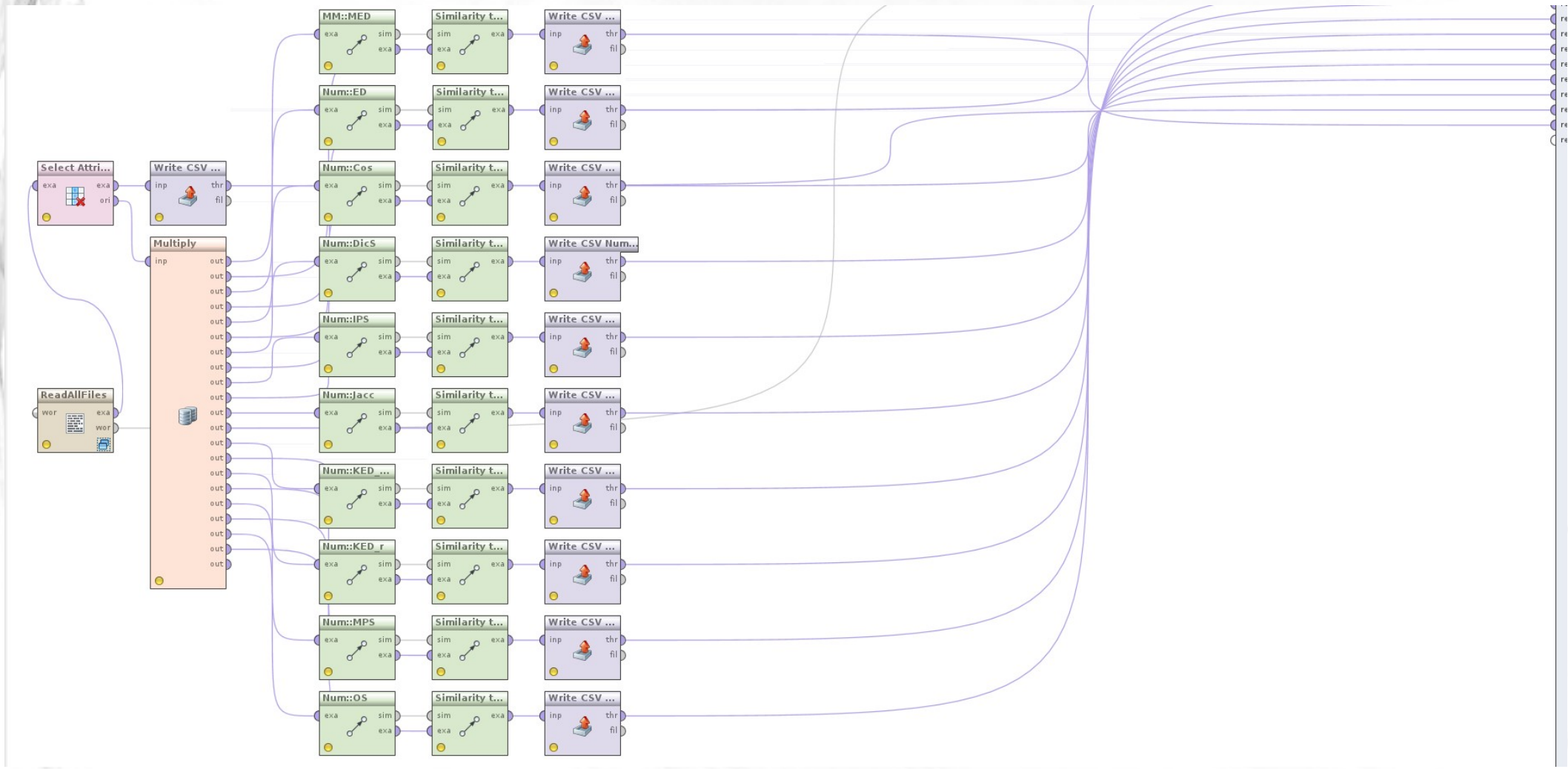
$$MC\ O\ S = presentUser\ \$\ filter\left(TF\ w_{ideeas}\right)\$\ map\ SC\ \$\ MI\left(getIdeas\ O\right)\left(getIdeas\ S\right)$$



Overview :: Details



Architecture



Results

ExampleSet (12 examples, 0 special attributes, 3 regular attributes)

Row No.	FIRST_ID	SECOND_ID	DISTANCE
1	1	2	1.414
2	1	3	1.377
3	1	4	1.340
4	2	1	1.414
5	2	3	1.408
6	2	4	1.409
7	3	1	1.377
8	3	2	1.408
9	3	4	1.362
10	4	1	1.340
11	4	2	1.409
12	4	3	1.362

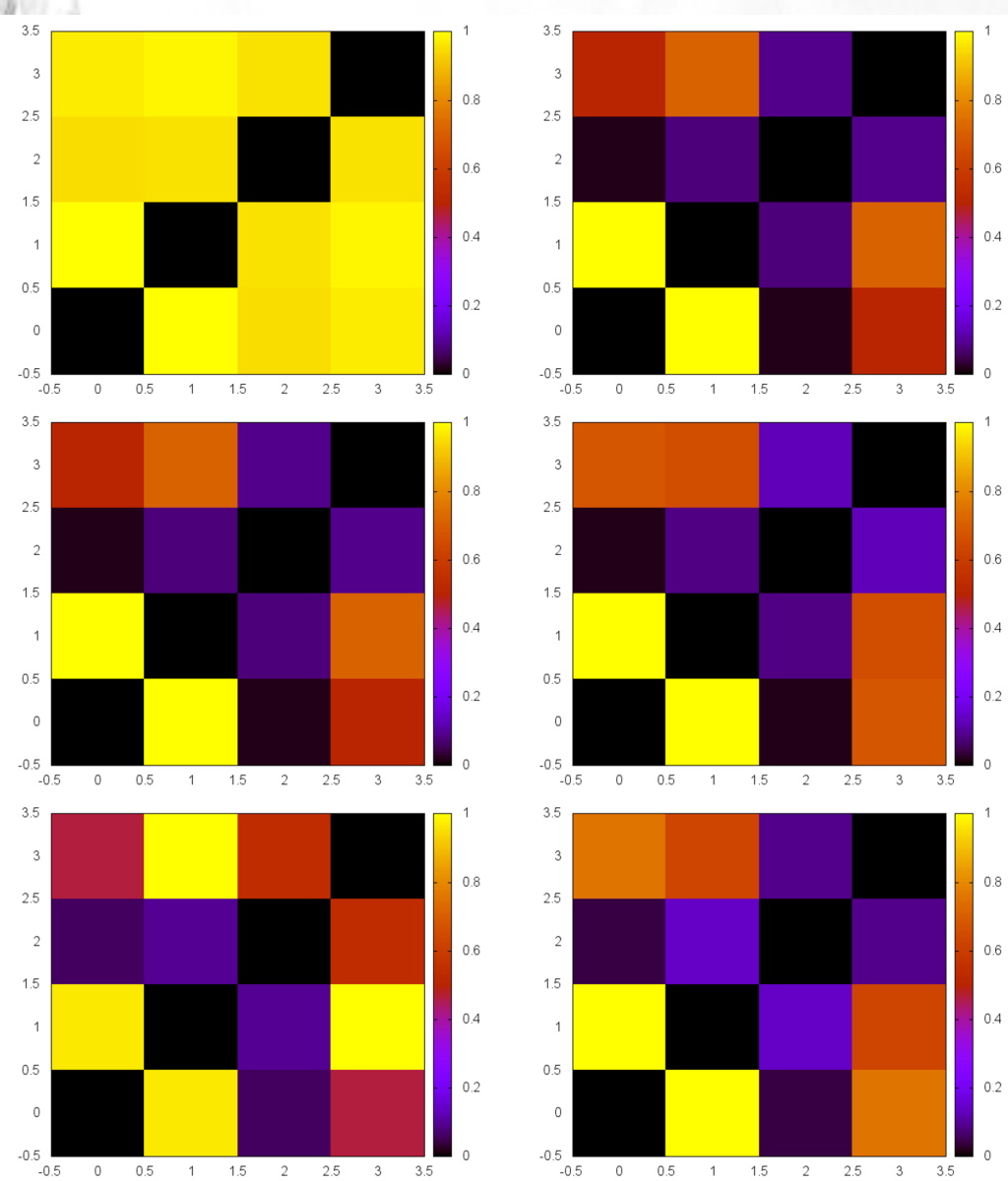
ExampleSet (4 examples, 5 special attributes, 0 regular attributes)

Row No.	text	label	metadata...	metadata...	metadata...
1	In the 180(	inputs	student2	tcase/input	May 9, 201
2	Once upon	inputs	student3	tcase/input	May 9, 201
3	The tiny En	inputs	student1	tcase/input	May 9, 201
4	Tristan Thc	inputs	original	tcase/input	May 9, 201

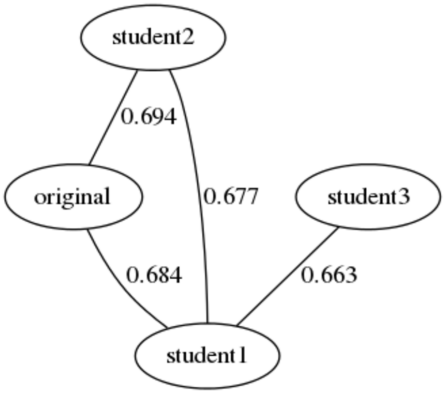
Results (2)

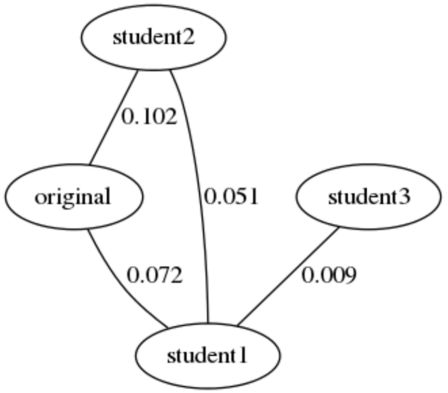
```
{1: 'student2', 2: 'original', 3: 'student3', 4: 'student1'}
NumDicS
      0.0000  0.0104  0.0002  0.0070
      0.0104  0.0000  0.0008  0.0068
      0.0002  0.0008  0.0000  0.0013
      0.0070  0.0068  0.0013  0.0000

NumMPS
      0.0000  0.0160  0.0010  0.0077
      0.0160  0.0000  0.0015  0.0164
      0.0010  0.0015  0.0000  0.0088
      0.0077  0.0164  0.0088  0.0000

NumIPS
      0.0000  0.1016  0.0010  0.0514
      0.1016  0.0000  0.0079  0.0721
      0.0010  0.0079  0.0000  0.0088
      0.0514  0.0721  0.0088  0.0000

NumOS
      0.0000  0.1484  0.0053  0.1116
      0.1484  0.0000  0.0209  0.0930
      0.0053  0.0209  0.0000  0.0128
      0.1116  0.0930  0.0128  0.0000

NumJacc
      0.0000  0.0052  0.0001  0.0035
      0.0052  0.0000  0.0004  0.0034
      0.0001  0.0004  0.0000  0.0006
      0.0035  0.0034  0.0006  0.0000

MMMED
      0.0000  0.6942  0.6607  0.6769
      0.6942  0.0000  0.6629  0.6838
      0.6607  0.6629  0.0000  0.6631
      0.6769  0.6838  0.6631  0.0000
```

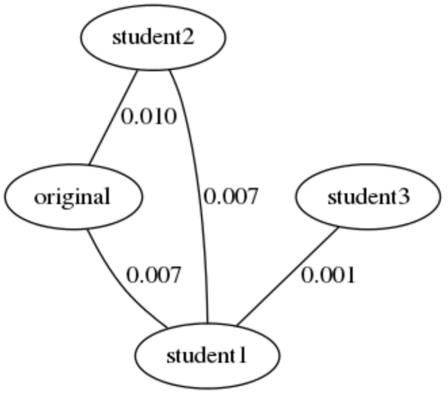
Results (3)

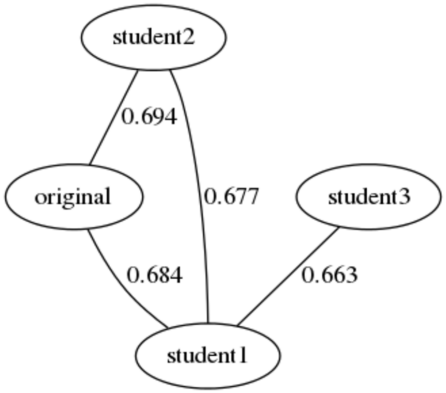


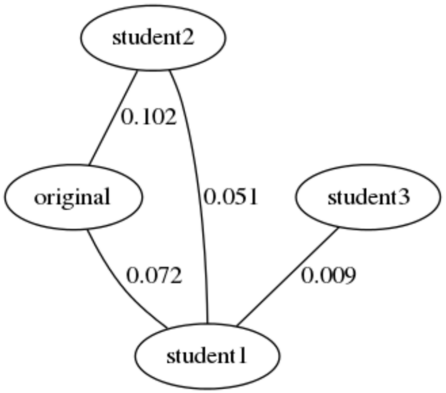
Results (4)

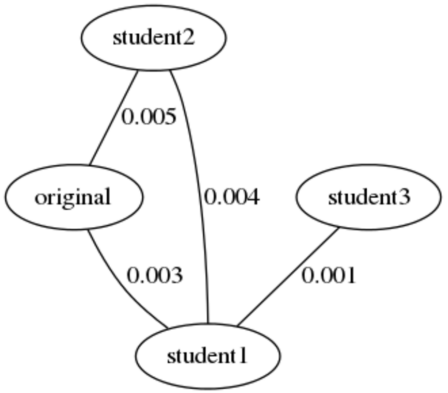

student2
0.694
original
0.677
student3
0.684
0.663
student1

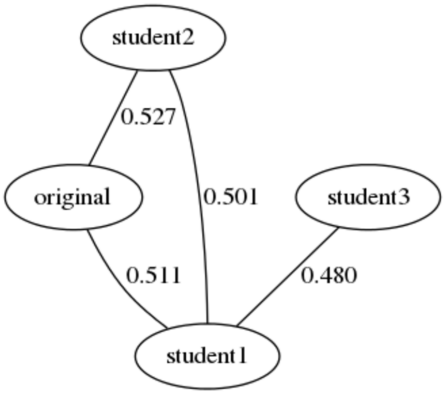

student2
0.102
original
0.051
student3
0.072
0.009
student1

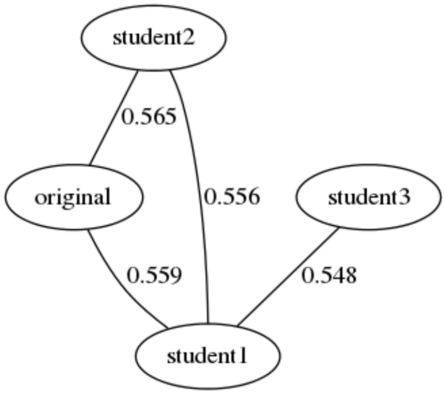

student2
0.010
original
0.007
student3
0.007
0.001
student1

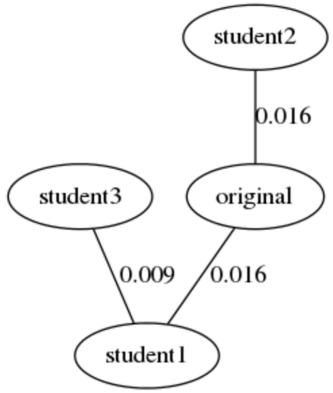

student2
0.694
original
0.677
student3
0.684
0.663
student1

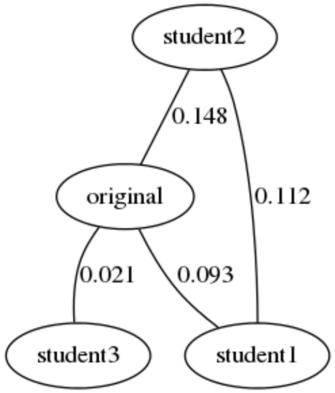

student2
0.102
original
0.051
student3
0.072
0.009
student1


student2
0.005
original
0.004
student3
0.003
0.001
student1


student2
0.527
original
0.501
student3
0.511
0.480
student1


student2
0.565
original
0.556
student3
0.559
0.548
student1


student2
0.016
student3
original
0.009
0.016
student1


student2
0.148
original
0.112
0.021
0.093
student3
student1

TODO

- More metrics
- Split by ideas
- Aggregate data
- Define metacognition value
- GUI

Thanks