Hypernetwork-based Peer Marking for Scalable Certificated Mass Education

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Motivation

Education for transdisciplinary Complex Systems Science

“Almost all of us know almost nothing about almost everything”

Objective

To provide free certificated education for thousands of people

By creating open online courses for complex systems science
Peer Marking for Scalable Education

Conventional education cost of marking = € k * N students

Peer Marking – every extra student is an extra marker
Peer Marking for Scalable Education

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Quality of Education

Students can benefit from peer feedback

Students can learn from peer marking other student’s work
Peer Marking – Major Problem

How can ‘ignorant’ students mark other students’ work?
Peer Marking – Major Problem

How can ‘ignorant’ students mark other students’ work?

Expert Marking – Major Problem

‘Knowledgeable’ professor give wildly different marks !!!

Differences up to 15% is normal

Difference of 30+% is common
Peer Marking – Major Problem

How can ‘ignorant’ students mark other students’ work?

Expert Marking – Major Problem

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There is no Gold Standard Mark!

Students can be better than professors!
Peer Marking – making it work

Marking reputation – can we detect good and bad markers?
Peer Marking – making it work

Marking reputation – can we detect good and bad markers?

Bootstrap problem – we don’t know anything at the start

Fundamental hypothesis

If two markers give different marks one or both is bad

Necessary condition: good markers give similar marks
Peer Marking – Hypernetwork connectivity

If M and M give n similar marks they are consistent markers

Consistent markers get a high reputation (are ‘good’

Étoile
Peer Marking – Hypernetwork connectivity

How to maximise the potential connectivity?

Experiment: 48 students x 7 lessons x 5 questions, May ‘14

Each lesson, student marks 3 other students & themselves

We tried groups of 8 and 16 students
Peer Marking – Hypernetwork connectivity  Results

• 8-person groups probably the best (highest connectivity) 7 assignment x 4 markings = 28 assignments per student design marking with all students sharing 12 makings each assignment has 5 questions (more sharing) > 6000 7 assignments x 4 markings x 5 question parts = 140 One question part had high variance - removed

• Differences > 15% are common > 50 % sometimes !

• Can detect some markers that are more consistent

• YRN challenge – students to analyse our data next week