Stimulating collaborative activity in online social learning environments with Markov decision processes

Matthew Yee-King and Mark d’Inverno, Goldsmiths, University of London

Research Question
How can we increase student engagement in social learning activity?

Motivation
• Interested in online social learning + feedback
• want to design better feedback systems
• how to implement systems in blended learning?

What is MDP?
Decide which action to take in a given system state to maximise future reward for minimal cost

MDP model for social learning

State | Action
--- | ---
0: low | read code
1: medium | open thread
2: high | run code
0 0 0 0 | 0 0 0 0
1 0 0 0 | 0 0 0 1
2 2 0 0 | 0 0 0 0
SxA -> S

Reward for action
\[ r = \sum_{j=1}^{M} p_j v_j \]
actions leading to high activity are good

Cost
\[ c = \sum_{k=1}^{K} (s_k + 1 - p_k) \]
rare actions are expensive

Results

Validation
Trained on observed state transition matrix, tested on unseen matrix

Next steps:
• Convert to xAPI
• Use the action policy to decide actions with a real cohort