Supporting the Encouragement of Forum Participation

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ABSTRACT
Abstract goes here

1. INTRODUCTION
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3. FROM POSTS TO CONNECTION GRAPH

Social networks are most simply modeled by considering each participant as a node, and interactions initiated by participants as out-directed links. In this case all nodes are of one type, and links are unidirectional. Multiple interaction initiations by one person are captured by weighting the corresponding outgoing links. Many graph analysis tools operate on models of this type, and this is the approach we chose.

However, other strategies exist to cover different goals. For example, [1] additionally consider linkages between forum post topics to include communication content in the model. When networks operate on particular platforms, such as underground forums, which include private 'buddy' connections, such facilities may need to be modeled [2].

For the purpose of identifying candidate time points for encouraging online conversation participation our chosen model suffices. We are not in this work considering additional measures, such as content quality, for which a richer model would be required.

Many measures are used to quantify various aspects of social graphs [?]. Not all are meaningful in the context of education-related forum interactions. We focus here on two measures: *out-degree*, and *page rank*. Figure 1 illustrates.
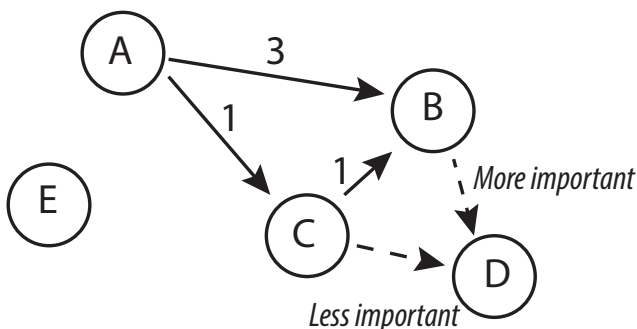

Figure 1: Example social graph induced by forum posts.

Nodes A, B, C, D, and E represent students. The link from

A to B is marked with the number 3, because A commented three times on one of more of B's posts. The number of outgoing links is the node's *out-degree*. For example, the *out-degree* of A is 4.

The number of incoming links is called the node's *in-degree*. Node C's in-degree is 1. Node E has no links entering or exiting. The respective student has not participated in the forum.

Analogous to Web pages, each node can be assigned a *page rank*. The intuition in this context is that student S_1's presence in the forum is more 'important' than student S_2's if the node representing S_1 has higher page rank than the node that represents S_2. In our context the intuition behind page rank is that a node N is more important (has higher page rank) the more other important nodes comment on N's posts. Imagine a scenario in which student S_1 posts an interesting question, to which many students comment with their opinion, creating a long thread. The node representing S_1 would experience an increase of its page rank with every incoming comment. Node B in Figure ?? is an example for this situation. Its in-degree is 4. If B were to comment on one of D's posts, then D's page rank would increase more than if the low-page-rank node C commented on D.

In terms of evaluating a student's participation in the forum, a high page rank, and high out-degree are positive. Low values are less positive. We chose these two values because of their relatively straight-forward meanings for forum posts. Other measures, such as *betweenness* are meaningful as well, and they are included in the drop-out prediction analysis of, for instance [3]. Also of interest are the contents of posts: students who persistently post irrelevant contents contribute less positively to the forum than constructively participating students. For the purpose of identifying moments where warnings or encouragement are in order the two measures of page rank and out-degree provide strong enough signals.

4. ANALYSIS PROCEDURE
We computed how in-degree and page rank changed week by week in a total of

5. CONCLUSION AND FUTURE WORK
- Consider student post content quality
- Consider consistency: contribute throughout course
- Consider influence on others

- Draw instructor attention to dense topic clusters, which might indicate confusion, or student excitement to harness.

6. REFERENCES

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