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ENHANCING WIKIGLASS WITH ANALYTIC FUNCTIONS FOR COGNITIVE DOMAIN AND AUTHORIAL STANCE DETECTION

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Wikiglass (Hu, et al., 2016) is a learning analytic tool aimed at relieving workload of teachers who are facing large quantities of accumulated student input when conducting inquiry-based instructional activities using wiki. The initial round of development has enabled the system to provide statistics for student collaboration and progress, and the present work is to integrate Wikiglass with the analytic component that can infer evidences of students' cognitive levels (Krathwohl, 2002) and authorial stances (Hyland, 2005) from the collaborative wiki text.

All the wiki textual data were fetched from the Wikiglass database. There were 12 classes in year 2013 which took part in the five-month inquiry-based group projects. Groups with around 5 students were formed in each class, and each group would construct wiki pages for their project. 103 final versions of wiki reports were selected as the corpus for analysis. Bloom's Cognitive Domain Taxonomy (Krathwohl, 2002) and Hyland's (2004) framework of meta-discourse categories were applied as the present framework for wiki text classification. Discriminate features were selected based on a Chinese version of Bloom taxonomy action verb list and keywords indicating authorial stances were generated based on works of Ai (2012) and Chuang et al. (2015). We built a program to automatically process and segment Wiki texts into sentence or clause units, and then each textual unit was tested for identifying cognitive domain and/or stance. It is assumed that, each unit would be labelled with only a single role in cognitive domain and stance respectively.

Statistics of the classification result indicate that inquiry-based collaborative learners in their wiki writings reveal intensive "knowing", "analysis", "evaluation", and "synthesis" cognitive levels, which seems reasonable and coincides with the fact that the present learning requires students to consult and make use of resources to yield conclusions. This inquiry-based learning process involves students in "knowing" the facts and truths, "analyzing" and "evaluating" those references, and finally "synthesizing" fragments of information and ideas to argue for their opinions and form conclusions. Besides, the collective authors are moderately arguing for their opinions, revealing in their texts frequent use of "hedge"s for posing stances. It can also be seen from the intensive use of "self-mention" indicators such as "we" and "our group" that group claims favor a collective base. The distribution of both cognitive levels and authorial stances are positively skewed, indicating that most group reports contained fewer instances in both aspects, while several groups did far better than others. Analysis also shows that the outstanding groups in cognitive domain statistics tend to get outstanding stance statistics as well, although their relative rankings change slightly. Finally, correlation and regression analysis indicate that "knowing" and "evaluation" are significantly related to final achievement scores.

Given the evidences, further work is warrant to investigate how students' cognitive domains and authorial stances can reveal the degrees of their group learning. Besides refining methods to elicit more appropriate and accurate evidences of cognitive levels and argument stances, future work will further explore the relations between these evidences and students' final achievements.

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