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	authors	<ul style="list-style-type: none">Mengxue ZhangSami BaralNeil HeffernanAndrew Lan	authors	<ul style="list-style-type: none">Mengxue ZhangSami BaralNeil HeffernanAndrew LanAntonija MitrovicNigel Bosch	DUPLICATES	119
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	abstract	Automatic short answer grading is an important research direction in the exploration of how to use artificial intelligence (AI)-based tools to improve education. Current state-of-the-art approaches use neural language models to create vectorized representations of students responses, followed by classifiers to predict the score. However, these approaches have several key limitations, including i) they use pre-trained language models that are not well-adapted to educational subject domains and/or student-generated text and ii) they almost always train one model per question, ignoring the linkage across a question and result in a significant model storage problem due to the size of advanced language models. In this paper, we study the problem of automatic short answer grading for students' responses to math questions and propose a novel framework for this task. First, we use MathBERT, a variant of the popular language model BERT adapted to mathematical content, as our base model and fine-tune it for the downstream task of student response grading. Second, we use an in-context learning approach that provides scoring examples as input to the language model to provide additional context information and promote generalization to previously unseen questions. We evaluate our framework on a real-world dataset of student responses to open-ended math questions and show that our framework (often significantly) outperforms existing approaches, especially for new questions that are not seen during training.	abstract	Automatic short answer grading is an important research direction in the exploration of how to use artificial intelligence(AI)-based tools to improve education. Current state-of-the-art approaches use neural language models to create vectorized representations of students' responses, followed by classifiers to predict the score. However, these approaches have several key limitations, including i) they use pre-trained language models that are not well-adapted to educational subject domains and/or student-generated text and ii) they al-most always train one model per question, ignoring the link-age across questions and resulting in a significant model storage problem due to the size of advanced language models. In this paper, we study the problem of automatic short answer grad-ing for students' responses to math questions and propose a novel framework for this task. First, we use MathBERT, a variant of the popular language model BERT adapted to mathematical content, as our base model and fine-tune it on the downstream task of student response grading. Second, we use an in-context learning approach that provides scoring examples as input to the language model to provide additional context information and promote generalization to previously unseen questions. We evaluate our framework on a real-world dataset of student responses to open-ended math questions and show that our framework (sometimes significantly) outperforms existing approaches, especially for new questions that are not seen during training.		
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