Supplementary for:
`Text2Math`: End-to-end Parsing Text into Math Expressions

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This is the supplementary material of Zou and Lu (2019c).

1 Initial Lexicon

Following the recent work (Roy et al., 2016), we developed a high precision lexicon to translate the text to mathematical expressions, like "sum of q_1 and q_2" translates to "$q_1 + q_2$", "the difference of q_1 and q_2" translates to "$q_1 - q_2$", where q_1 and q_2 denote quantity placeholders. Such a lexicon is used to check the predictions of our model. If a problem text contains an entry of the lexicon but the prediction is not consistent with the translated expression, then we adopt the expression returned by the lexicon to rectify the prediction. Otherwise, the prediction made by our model is directly adopted.

2 Experiments

2.1 Datasets and Settings

Datasets. The AI2 dataset, originally released by (Hosseini et al., 2014; Zou and Lu, 2019a,b), consisting of 395 arithmetic word problems on addition and subtraction. Roy and Roth (2015) provided the IL dataset containing 562 elementary problems where all four basic math operators (namely addition, subtraction, multiplication and division) are covered. Additionally, we also evaluate our model on the equation parsing dataset (Roy et al., 2016), consisting of 385 sentences each of which is annotated with a math equation containing one or more variables. It is worth noting that for arithmetic word problems, we focus on mathematical relations among numbers and calculate numerical values of the predicted expressions. However, for equation parsing, there exist maximum two variables residing in an equation. We thus regard a predicted equation as a correct one if it is mathematically equivalent to the gold equation (Roy et al., 2016).

Baselines. We compare our model, `Seq2Math`, against various prior systems, including template-based methods (Kushman et al., 2014; Hosseini et al., 2014), reasoning-based approaches (Roy et al., 2015), meaning-based methods (Liang et al., 2018) and works of (Roy and Roth, 2015; Koncel-Kedziorski et al., 2015) applying integer linear programming to find optimal solutions. As for equation parsing, Roy et al. (2016) designed three structured predictors with a high-precision lexicon to make decisions. Such predictors can be trained in a pipeline fashion (denoted as **Pipeline**) or jointly (denoted as **Joint**).

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