SolveDeep: A System to Support Learners' Subgoal Learning in the Context of Math Problem Solving

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Motivation

Learners solve math problems better with subgoals in mind.

$6x + 10 = 2x + 4$
$-10 \quad -10$ — Isolate variable
$-2x \quad -2x$
$6x - 2x = 4 - 10$
$4x = -6$
$/4 = \ /4$ — Simplify terms
$x = -3/2$

Individual steps make up subgoals, and subgoals make up the solution.

Lack of personalized guidance

for active subgoal learning

Challenge

Online learners do not receive personalized guidance for subgoal learning because of its high development cost.

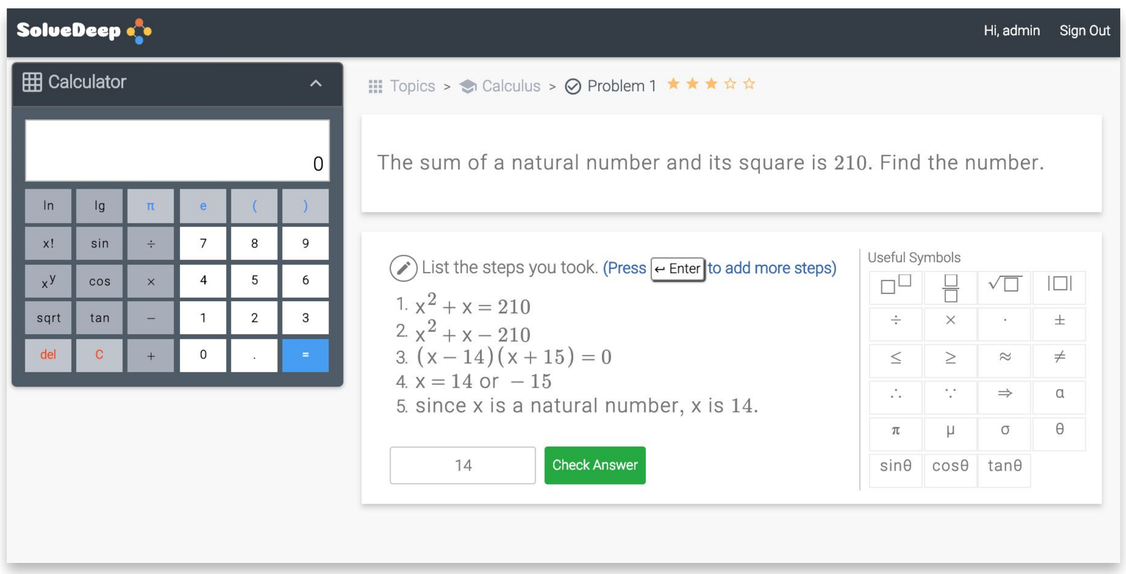
Solution: Learner-driven approach

Collect complementary subgoals from learners and give personalized guidance to future learners.

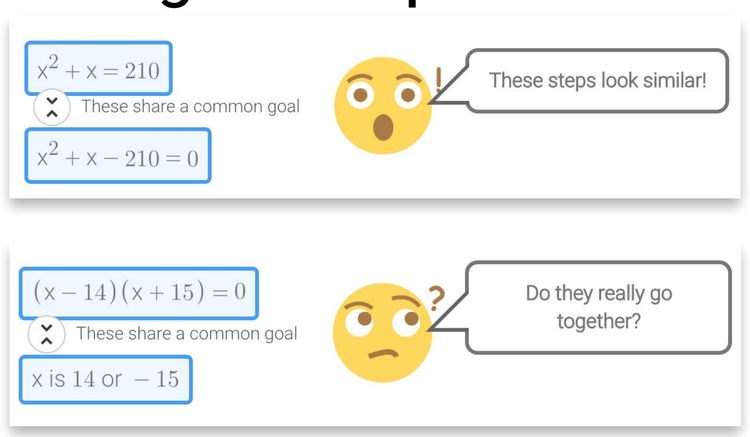
Use learner-generated subgoals

to give guidance

System

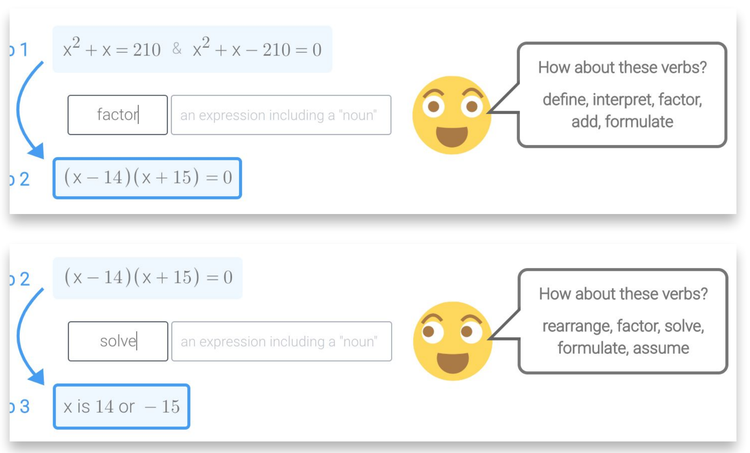


Stage 1. Group



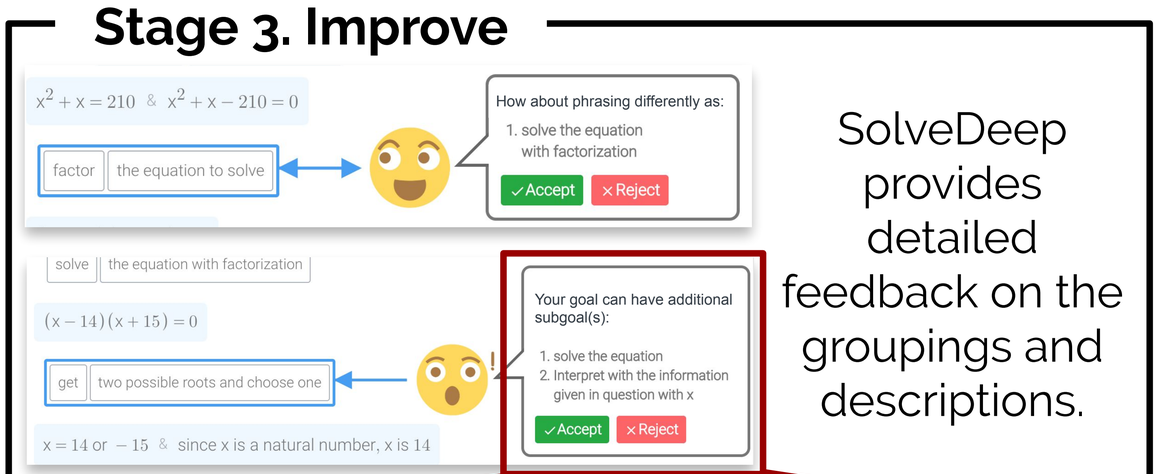
SolveDeep encourages the grouping of similar steps.

Stage 2. Describe



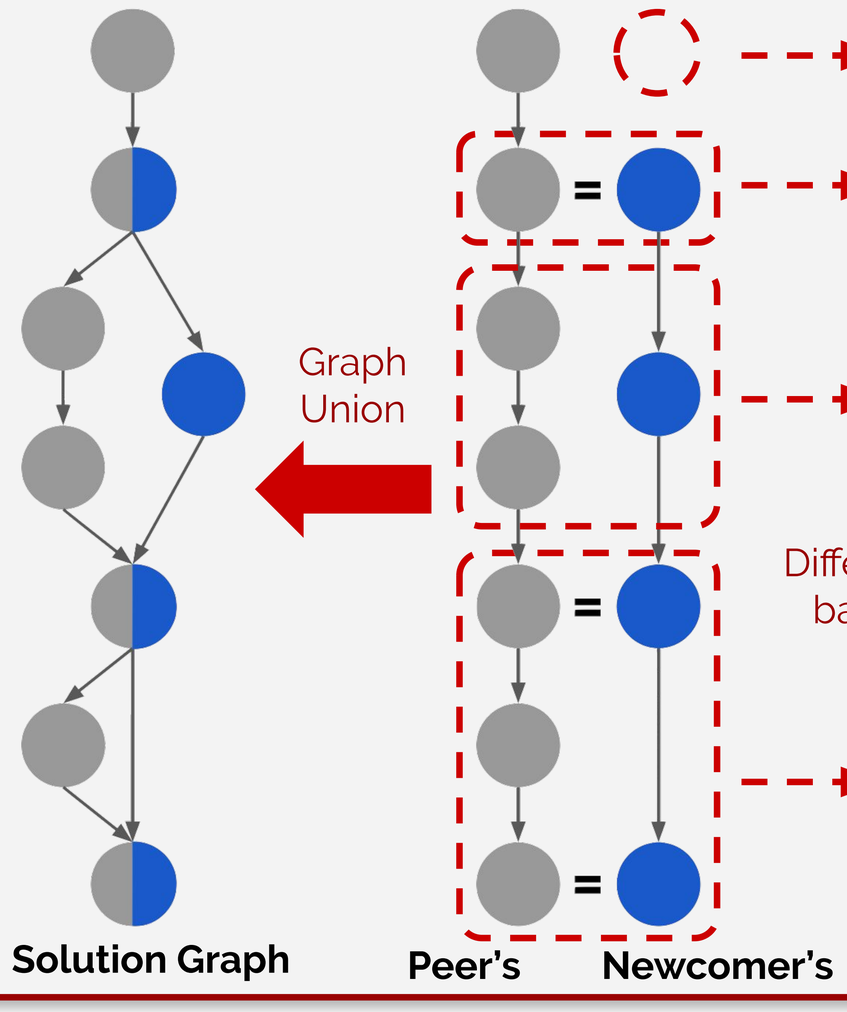
SolveDeep suggests useful terms regarding the position of subgoals in a sequence.

Stage 3. Improve



SolveDeep provides detailed feedback on the groupings and descriptions.

Pipeline: To generate feedback on subgoals



Feedback 1: identify overlooked steps.

Feedback 2: suggest better terms.

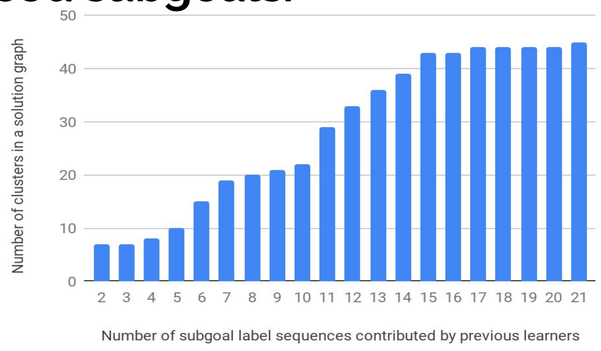
Feedback 3: show an alternative approach.

Feedback 4: identify additional subgoals.

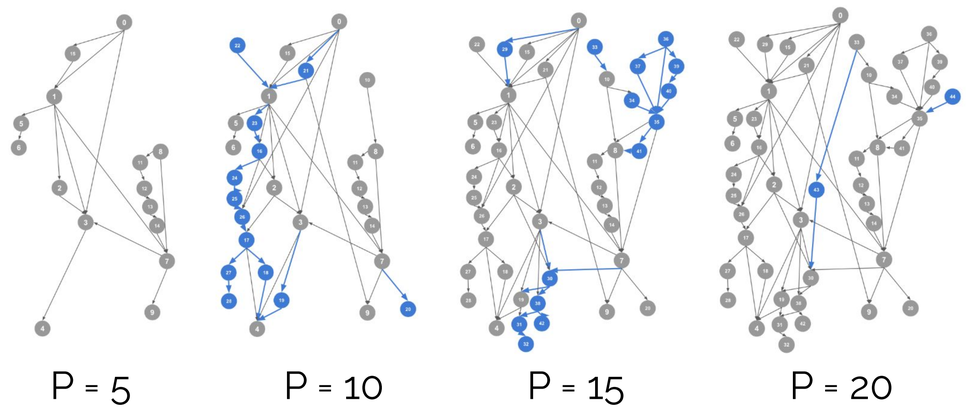
Different types of feedback based on the alignment

Evaluation: To see how SolveDeep matures with learnersourced data

1. Solution graph saturates after collecting enough learnersourced subgoals.



2. New strategies can be found from learnersourced solutions and subgoals.



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