PL-Based Educational Technology

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CheckMark is a system for automatically diagnosing student misconceptions.

Joint work with Erik Andersen and Monica Ong.
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\begin{align*}
37 - 4 & = 13 \\
43 - 1 & = 32 \\
85 - 3 & = 52
\end{align*}
\]
Misconception Detection
Misconception Detection
How to Identify Misconceptions Automatically

Reverse Engineering Student Thought Processes
How to Identify Misconceptions Automatically

Reverse Engineering Student Thought Processes
for each digit $t$ in the top row:
subtract the bottom digit from $t$

Correct Subtraction Algorithm

Program Synthesis
CheckMark in Action

Student Submission: Second, the student decided to subtract the smaller value of 3 and 4 from the larger, obtaining 1.

Correct Algorithm: Second, copy the value 3 and place it in the highlighted result location.
Program Synthesis
PL Backend
Program Synthesis

Tools
Misconception Detection

Education Applications
K-12 Math

Functional Programming
PL Backend

Program Synthesis

Tools

Misconception Detection

Education Applications

K-12 Math

Functional Programming
Thank you!

www.cs.cornell.edu/~molly/checkmark.html

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