Recognizing Opportunities for Mixed-Initiative Interactions in Novice Programming

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introduction

• learning programming is difficult
• novice programmers need help

▷ how do we help the users?
helping users

- novice programmers usually understand syntax at the lexical level
- we want them to start understanding the syntax at the pragmatic and semantic level

- usually, we have only the results of their programming exercises
- to help them better we need to see their process and interactions
  - using formative data, we can help the novices while they are learning
  - need to present information to them at the right time
getting formative data

- compile time segments (CTSs)
- differentials between consecutive versions of the AST
- generated at each compile cycle
- compiler output

- allow us to find errors and identify areas where user needs help
types of data

- compile time analysis of CTSs
- differentials in constructs
- compiler output
- construct differentials and compiler output
compile time analysis of CTSs

- number of compiles
- LOC
- number of errors
- degree of completion

average compiles: 11 to 20
extreme: 72 in 90 minutes
differentials in constructs

- changes in expressions
- LOC

changes in LOC of a student
• difference between compiler output between CTSs
• shows where students make mistakes
construct diffs and compiler output

- relationships between CTSs and compiler output
- particular compile error can be mapped onto a change in code
• record interactions between user and IDE
• compiled, debugged, ran

› allows us to recognize SRL patterns
data analysis

- using SRL patterns
- CTS analysis results

- opportunities for user interaction initiation
  - try to find a place where user has finished a task or is unsure how to continue

- ★ students stop to verify code they’ve written (compilation)
current work

- MI-EDNA
- Learning Data Structures with Java
future work

• determine the types of interactions that are suited to help users in this domain

• implement IDE that allows us to observe user interactions

• implement IDE that allows us to initiate MI interactions
thanks

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