Bedarra Research Labs

Touch Programming for Pictographic Expression Languages

Bachelor Project Proposal, WS 2012/2013 – SS 2013
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Programming on Mobile Devices

Mobile devices such as tablets and phones allow users to easily select, display, and update structured and free text information. However, these devices provide very limited capability for knowledge workers who need programmatic access to their data. The current belief is that it isn't realistic to use phones or tablets for developing programs unless extended with physical keyboards and larger screens like PCs.

In order to program on these devices, users have to tediously enter textual languages. Traditional programming languages were developed to be written with a traditional program editor on a PC. Visual languages are better suited to be manipulated by touch, however, the complexity of programs is constrained by the space required for the visual elements.

Pictographic Expression Languages

This project investigates a touch interface for programming in pictographic expression languages. Ideally, touch programming should be as fast or even faster than programming on a PC. Expression languages from simple regular expressions to more complex array programming provide maximal expressive power in a very compact form. They make it feasible to express complex queries and computations such as relational programming; graph programming; pattern matching; data flow computations on mobile devices.


Pictograms allow a language to be extended from a limited alphabet to a much larger alphabet enabling the concise expression of nouns and verbs via simple pictograms. Pictograms denote domain specific nouns and verbs via appropriate iconic characters. Such interfaces may also be attractive to users whose mother language is pictographic. The combination of an expression language and pictographic representations function and variable names enables extremely compact programs.

Touch Programming Environment

The project explores a novel touch interface for programming in dialects of SQL, Perl, and APL. The goal is to support one and two-handed development of non-trivial programs using touch with ideally no keyboard entry. The interface must make it easy to edit lines of code avoiding the problems found on today's text entry widgets. Specifically it must be easy to insert and remove operators, functions, and variables without use of a keyboard. It should also be possible to perform common expression editing operations such as switching dyadic operator arguments from left to right, inserting or removing brackets.

Given a large library of nouns and verbs, it is important that the interface has to be designed to easily find and use the appropriate pictogram. For example recently used nouns and verbs will be automatically suggested during programming. Readability of dense code shall be supported through embedded comments, coloring, and other visual cues.

Beyond the editing of programs, debugging could be supported through the visual display of code replacing variables by their values at run-time. Break points, watch points could be special pictograms inserted at the appropriate point in the code.
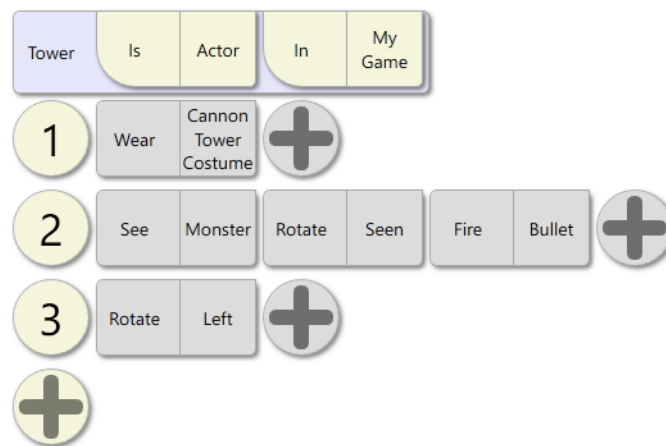
[McDirmid, Coding at the Speed of Touch, Onward! 2011]

Since documentation of dense expression code is very important, the project might also explore the use of pictographic expressions for this use.

Organization

A group of about six to eight (6-8) students may participate in the project. Organization and tasks will be determined by the project participants. The project will be carried out at the Hasso-Plattner-Institut in Potsdam. Project participants are expected to communicate with our partner via email, chat, or voice on a regular basis. In winter term 2012/2013, participants will work on initial design sketches and prototypes. Main steps in design and implementation are to be executed in summer term 2013. Expected results include a working software system accompanied by appropriate documentation. Extreme Programming (XP) and other agile methodologies will be employed for software development

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