A research of flexible visualization tools for supporting comprehension of source code

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1 Background and Purpose

Amount of source codes grows larger according to highly efficient. Therefore development and maintenance of them requires many developers. As the result, a developer must understand source code created by others. But it is difficult to understand the structure of the source code when the code is intricately and large. By such a situation, it becomes more important to use tools for supporting comprehension, traditional tools have some common problems. (1). hard to control the granularity that the user want to display the source code. (2). hard to pass on the knowledge between users. The goal of this research is to propose a visualization tool to handle flexible units and helps to share knowledge among many developers who engages in the source codes.

2 Problems and Solution

Concerning about issues in display units, traditional tools have a problem that is too far-reached from a function and a line because its tools only give variable, line and function. That is to say, those tools can't satisfy variety requirement from users because functions might give too mush and

lines might give too little information. We purpose a display unit to be a intermediate size between function and line (called "Semantical-Block"). The extraction of Semantical-Block becomes possible by introducing the filter. The filter explains bellow.

Traditional tools target only one user using at that time, so we develop tool that targets two or more users. It is help to pass on the knowledge that user-A got by using tool to user-B when user-B have similar goal of user-A. The knowledge means the parameter of filter. This reason is that user's requirement is the parameter. And this function resolve complexity of manipulate that generated by flexible display. This research develop tool that use some filter and the parameter.

3 Visualization tool in this research

Our visualization tool requires the following features: (1). flexible control the units of extraction, (2). recording the parameter of filter and showing the parameter to the others This visualization tool consists of analysis, extraction and display parts to satisfy these requirement.

We use Sapid(Sophisticated APIs for CASE tool Development) as syntax and semantic analysis of source codes(described by C or C++ Language). Sapid is based on a fine grained software repotiroy. Sapid can keep the comment that is important for supporting comprehension into source code. By using this tool, our visualization tool create AST(Abstract Syntax Tree).

We define Semantical-Block that extracted information by filter from result of analysis. The filter have five methods for extracting Semantical-Block. (1).control statements of if, for and while and switch (Syntax elements that consists of the relation based on syntax tree), (2).declarative and executing part of function (part of variable declaration and executing process), (3).appearing range of the variable which the user take notice (row including the variable), (4).appearing variable in part of right expression of substitution statement (row defining the variable), (5).backward and forward of the row which the user take notice (continued row including information to satisfy the user's requirement). The way of (1)-(4) extract based on syntax tree, but the way of (5) doesn't. This way of (5) has an effect on the occasion that information to satisfy the user's requirement is

located near in physical space The way of (3) is the same as cross reference. The way of (4) is the same as phased doing of slicing. That is to say, that way means that is possible to decide range of extracting row which define the variable. User is able to flexible extract when used in combination these filter. The "combination" means logical addition or multiplication. The parameter using by these extraction are recorded for passing on the knowledge to others.

The way of display information getting by extraction is only one way that display the letter on the screen. It become higher visibility by changing character size or color. The way is such as changing size of the variable which the user take notice, coloring character of the variable which appear in part of right expression.

4 Conclusion

Thus our study develop visualization tool that have these function and allow greater flexibility that have not been exist before.