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A Multi Model View Of Process Modelling With Dynamic Path Selection Based On Resource-Constraint

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Abstract:
This paper aims to reduce the specific nature of process models by providing allowances for deviations from the specified path to occur. It aims to create a more dynamic process model which provides alternative paths for a software engineer to achieve a particular goal, and then to even choose the best path, based on the resource-constraint. The multi model view of process modelling supports this dynamicity, and hence that'll be the focus of this paper. The eventual model will be similar to a weighted graph, where the nodes will represent the goals that the software engineer wishes to reach and the edges would represent what needs to be done (or the strategies) to move from one node to another. The edges would also be assigned weights, for each resource. Then, based on the developer's resource constraint, the best possible path will be chosen.

1.Problem Description

Process models play an important role in software engineering, especially of late, when the general idea amongst engineers is that the better the development of the underlying processes of a software, better the overall quality of the product. Process models specify a path that a product developer must take to achieve completion. However, the software engineering community identified pretty early that in product development, there were almost always deviations from these specified paths [7]. So, more effort was concentrated on trying to account for these deviations. A proposed method was to allow deviations to a certain extent, and a constraint was then placed on this extent, thereby allowing deviations within the constraint [6]. This method however wasn't very helpful because it added to the static nature of a process model. It only further appended specifications to the specified path.

In slightly later models, the deviations allowed were not so strict. They also allowed for a choice of what could be done, and did not always specify an absolute what-to-do path [3]. One of the process models that evolved in this period was the intention-strategy (where intentions are the probable goals) process model [5]. This model is represented as a map, where the nodes represent the intentions, and the edges represent strategies.

The software engineer can traverse this map, either based on strategy-selection or based on intention selection. If he/she selects a goal (intention), there may be alternate paths to achieve it, and each path will have different strategies and intentions as part of it. The software engineer is provided with all these alternatives, and can choose a path from the available ones. This model can be represented as shown in Fig 1:

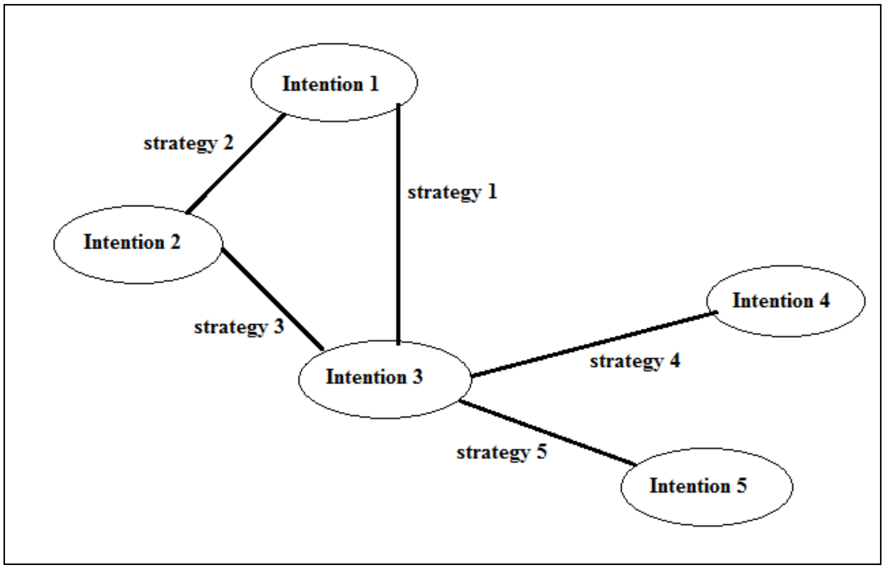

Figure 1

So, if the engineer wishes to reach intention 4 from intention 2, he can choose between carrying out strategies 1, 3 and 4 or 1 and 4. However, the engineer will still have to “choose” a path. This choosing will itself be a time consuming process, wherein assessment will be required at each node. We wish to transform this process model into one in which the software developer need not waste time in deciding what path to choose. The process model decides the path for him/her, based on simply his/her resource constraint (Rules for defining software constraints in [2]).

2.The Proposed Solution

Before proposing the solution, we need to introduce *meta-process models.* A meta-process is a process used for the construction of process models. In this case, the meta-process will be used for path generation from the map, based on the current status of the development process, and the intentions and strategies specified by the software engineer. Multiple paths will be generated and the engineer will have to choose his/her path. We wish to convert this meta-model into one which decides on just one path, so that the time consuming need to choose can be entirely eliminated. For this, the graph in Fig1 is converted to a weighted one. Weights are given based on the various resources that affect the development of the software, which are time, cost, possibility of errors, etc. Then, based on the resource constraint on the developer, only one path will be chosen. The process model will now change to what is shown in Fig2:

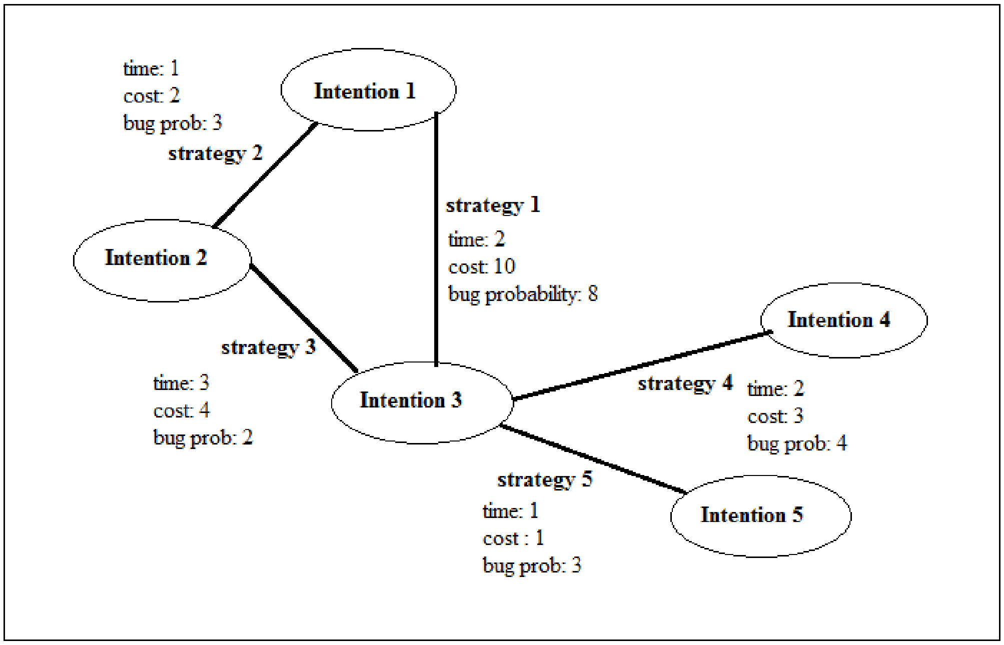

Figure 2

Bug probability is determined based on the size-defect relationship as proven in [4]. So, smaller components are given a high bug probability. Now, if the engineer's resource constraint is cost and he has to move from Intention 1 to Intention 4, the meta-model will automatically choose the path via intentions 2 and 3. Similarly, if the resource constraint is time, then the shorter path via Intention 3 will be chosen. This way, we are allowing for deviations from the process model, and saving hugely on development time, by always being ready with a dynamic path for the developer to take, based on his requirements.

3.References

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