A JPL Software Reliability Study and a Windows-based Software Reliability Tool

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Abstract:

Recently, a study was undertaken at the Jet Propulsion Laboratory to determine the applicability of current software reliability measurement techniques to JPI, development efforts. One of' the findings was that there is no known method for identifying the model. most applicable to a development effort prior to test [3]. This can be mitigated, however, by executing several models at once and using statistical methods to identify the model that is most likely to produce accurate results [1,2]. The results of the study has also shown that more accurate predictions can be produced by combining the results of several models in a linear fashion [3] or by recalibrating a model based on its predictive bias [4].

During the study, several of the currently available tools [5] were used. We found that many of them were difficult. to use. The outputs of many tools are presented in tabular rather than graphic form, and include quantities such as model parameter estimates which would not be understood by most software developers and managers. Most of the tools also had limited graphics capability, producing a limited variety of character-based plots. Finally, operating some the tools was more difficult than it might be, since many of the tools had command-line or batch file command interfaces rather than pull-down menus or direct manipulation.

A software reliability measurement tool., CASRE (Computer Aided Software Reliability Estimation) that addresses these ease-of-use issues has been developed. CASRE, a Windows-based tool, incorporates the mathematical. modeling capabilities of the public domain tool SMERFS [6]. The command interface is menu driven; selective enabling and disabling of menu options guides users through data selection, model execution, and analysis of model results. Failure data is simultaneously displayed as text and as a high-resolution plot that can be controlled to let users view the data in a variety of ways. Model predictions and statistical evaluations of a model's applicability may be superimposed on the plot of the failure data. CASRE also incorporates the study's findings that prediction accuracy may be increased by combining the results of several models in a linear fashion. Users can define their own model combinations, store them as part of the tool 's configuration, and execute them in the same way as any other model.

References

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