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Software requirements verification tool

Requirements for aviation software are made in the form of a document. Manual verification of readiness and compliance with this document is time-consuming and can lead to significant errors. Formalization and construction of a mathematical model of requirements for evaluating their implementation will reduce risks.

Requirements and its evaluation.

Software is used in all spheres of human life, even in aviation. Software development in aviation requires rigorous verification at every phase of development. Typically, aviation software developers use the classic software life cycle model – W-model [1]. The result of the initial phase is the product requirements document (PRD). There must be a clear understanding of the characteristics of the finished product. Those product requirements help to rationally distribute time and effort as well as eliminate most risks. However, it only applies if a PRD document has been written unambiguously. This document specifies all the necessary information for developers and on its basis develops the software architecture, its functionality, appearance, security requirements, etc.

If errors in the requirements are made, they will later lead to human and financial losses. Verification of artifacts at all phases is implemented in the software development. These verify are time-consuming and may contain human errors. To eliminate errors during verification are used other automated tools, development tools, etc.

At the end of each development phase, a lot of different information about the quality and compliance of the implemented artifacts is accumulated. For their analysis, it is necessary to use reliable decision-making techniques to continue the development of software for aviation. Safety and reliability are important for aviation. Therefore, when choosing a method for deciding on the implementation of the requirements, strict requirements were set for accuracy and efficiency. Professor Voronin's [2] method of multicriteria evaluation turned out to be the most accurate.

Mathematical model of decision-making.

The thesis proposes to use the method of multicriteria evaluation, namely the use of the technology of nested summaries of Professor Voronin [2-5]. This method consists of the following stages:

1. identification of factors, indicators, criteria by which it is necessary to assess the quality and compliance with the requirements.
2. formation of a model of decision making.
3. interpretation of the received decision according to a fundamental scale of estimation.

Stage 1. At the stage of formulating an infographic model of factors, indicators, and criteria, it is necessary to determine the necessary properties that the aviation software must meet. Then they are grouped into factors that are grouped into groups and the desired criteria are determined what they should strive for max or min.

Stage 2. A model for decision-making is formed, which consists of summarizing (aggregating) the list of contradictory partial criteria to the generalized assessment. For this purpose, a nonlinear scheme of compromises of Professor Voronin [2] was chosen. Within the group of factors, a partial reduction of partial criteria to those generalized by the group and the integrated criterion of efficiency is carried out. This implements the technology of nested convolutions and ensures the sensitivity of the final solution to changes in each partial criterion.

Stage 3. The interpretation of the obtained solution is to reduce the value of the integrated assessment to a single scale of change, for example, from 0 (worst) to 1 (best). The described mathematical model is based on a consistent grouping of partial criteria for integrated assessment. The obtained numerical assessment can be reduced to a linguistic category according to the fundamental rating scale (table 1).

Table 1.

Fundamental rating scale

Integrated quality assessment	Linguistic category of quality
1.0-0.7	High
0.7-0.5	Good
0.5-0.4	Satisfactory
0.4-0.2	Low
0.2 and less	Unsatisfactory

Conclusion

Nowadays, any mathematical model can be programmed. Therefore, research in the field of software verification to their requirements can be implemented. The most difficult thing in the methodology is to identify the infographic model of factors and their criteria, it is at this stage that errors or inaccuracies are possible.

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