ABSTRACT

Accurate size estimation of software projects during early phases of Software Development Life Cycle (SDLC) is important, since it helps the practitioners in better decision making with respect to manpower and cost.

Towards addressing this need for a unified developmental and test size estimation model for Object Oriented (OO) software, an adaptation of the standards based Function Point Analysis (FPA) model is proposed in the present work. The adaptation captures the various properties of the OO software at the analysis and design phase of the SDLC based on Unified Modeling language (UML) diagrams. Development and test size estimation during the analysis phase is determined by deriving the estimation components from the UML use case model. Development size during the design phase is determined by deriving the estimation components from the UML object model.

A new method named as UCM Function Point (UCMFP) to estimate the developmental size of the OO software at the analysis phase itself is proposed. While this approach is based on UCM, it also adapts the Function Point Analysis (FPA) technique to UCM. Various features such as actors, use cases, relationship, external reference, flows, and messages are extracted from UCM. Eleven rules have been derived as guidelines to identify the UCM
components. The FPA components are appropriately mapped to UCM components and the complexity based on the weightage is specified to calculate the UCMFP.

A new method, namely, System Test Size Point (STSP) to estimate the system testing size of the OO software at the analysis phase is proposed. This approach for the system test size estimation based on UCM is achieved by adapting the FPA technique. Various features such as use case graph, test set, test set suite, relationships, main flow and alternate flow, are extracted from the UCM. Based on this, UCM components for estimation are derived. The FPA components are appropriately mapped to the UCM components and the complexity based on the weightage is specified to calculate the STSP.

Furthermore, a new and enhanced approach Object Model Function Point (OMFP) to estimate the OO software development size at the design phase based on the UML object model is proposed. Various features such as association, aggregation, inheritance, multiple interactions are extracted from object model using the proposed estimation guide rules for estimation. The FPA components are appropriately adapted and the complexity of the software in terms of Function Points (FP) has been derived.

The three size estimation methods are applied on sample OO software projects developed in an in-house software engineering laboratory. The estimation methods are empirically validated using statistical techniques.
The results demonstrate that the development and test size can be estimated accurately during the analysis phase itself. For projects that can wait until the design phase commences for estimation of size, the proposed development size estimation method based on the object model produces accurate results.