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Research Article

Selecting Suitable Requirement Elicitation Technique for Development Methodologies

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Abstract: Requirement elicitation is one of the early stages of requirement engineering and is critical in the success of any software development project. There is several elicitation methods presented in the literature: interviews, surveys, brainstorming and others; all of which have their strengths and weaknesses. However, the selection of technique is normally arbitrary as software engineers tend to choose based on their own past experiences. This paper aims at developing a new method for identifying the appropriate requirement elicitation technique based on certain characteristics of the project. The approach is based on regression analysis that captures the most important factors that determine the choice of the elicitation technique depending on the project domain. A classification and regression tree model is implemented to systematically identify the optimal technique, reducing the subjectivity associated with requirement elicitation.

Keywords: Requirement Elicitation; Regression model; Attribute selection; Model;

1. Introduction

Requirement engineering is one of the fundamental phases of software development life cycle and has a direct impact on the quality and outcome of the Software Product. It is very essential in systematic process where the requirements which form the basis of other activities are identified, documented, verified and controlled. As pointed out by [1], quality of requirements represents a major driver of the cost and time needed to complete the project as well as the success of the project; requirement elicitation was cited as one of primary reasons for project failure.ng, validating, and managing the system requirements that serve as the foundation for all subsequent development activities. As noted by [1], the quality of requirements has a profound impact on the project's cost, timeline, and ultimate success, with poor requirement elicitation being one of the leading causes of project failure. As stated by the Standish Group in the CHAOS Report [2], problems with requirements account for many of the failed software projects, meaning that techniques for requirements elicitation are issues important for success. In the requirement elicitation phase, which is the first phase in the requirement engineering, the primary concern is the identification of the users, client's and other domain experts' needs. In this phase, methods such as interviews, questionnaires, surveys, focus groups, and brainstorming sessions are used, and differ by the application in the project [3]. However, no such technique is generic to be applied across the board as every project has different requirements in terms of size, complexity, distribution of stakeholders and domain specific [4].

It is prerequisite to choose the suitable elicitation technique so that all the requirements are fully and precisely gathered. However, this selection process is rather selective and mainly based on engineers' preferences or even their past experience [5]. Moreover, there is a lack of standard guidelines to determine how the technique best suits the project in question and allows for harmonizing the scope and nature of the applied technique in all the projects that were investigated. In order to overcome these challenges, this paper recommends a best-fit approach of selecting requirement elicitation techniques based on key project characteristics such as size, complexity, stakeholders and domain. This approach applied regression analysis to establish the significant predictors of the affectivity of various elicitation techniques. The proposed method helps to avoid bias and be more revolutionary to select the most appropriate technique for each project and to get more accurate and complete the gathered requirements. An extended predictive model for classification and regression is used for testing the approach with tangible success. Based on the attributes of a project, this model can predict the appropriate elicitation technique to be used from the database of previous similar projects from different domains. Through finding ways of applying this model, then software engineers and project managers will be in a position to select the apt elicitation techniques to meet the stakeholders' needs as they work towards developing the right system product. The choice of an appropriate elicitation technique should therefore be made in order to achieve an accurate and thorough capturing of requirements. However, this selection process is not free from bias where engineers tend to make decisions based on personal bar or previous performances [4]. In addition, there is no accepted practice on how one can choose the appropriate technique depending on the characteristics of a given project; this results into inconsistency in methods used for elicitation across different projects. The remainder of this paper is structured as follows: Section 2 presents a critical analysis of conventional requirement elicitation methods and their drawbacks. Section 3 describes the regression analysis process of choosing the elicitation techniques elicitation. Section 4 highlights the predictive model and provides a validation and performance of the model. Lastly, Section 5 summarizes the findings of this paper whereby the significance of the proposed approach and its relevance to software engineering practice is shown.

The core issue lies in the lack of a structured framework to select the most suitable requirement elicitation technique (RET) for different software development methodologies. This challenge becomes more pronounced when considering safety-critical systems, where improper requirement elicitation can lead to serious safety risks. Existing safety evaluation methods often fail to adequately integrate the specific needs of the development methodologies being used. For example, agile development focuses on flexibility and iterative delivery, which requires elicitation techniques that adapt to evolving requirements. Conversely, traditional methods like Waterfall rely heavily on upfront requirement clarity, necessitating techniques that thoroughly analyze initial user needs.

This misalignment creates several challenges:

- Difficulty in mapping elicitation techniques to the context of specific development methodologies.
- Inadequate identification of safety-critical requirements due to the generic application of RETs.
- Lack of criteria to evaluate the effectiveness of RETs in ensuring comprehensive requirement coverage, particularly for safety aspects.

The presented approach introduces a structured evaluation framework for selecting suitable RETs based on the characteristics of development methodologies and safety requirements. This framework addresses the challenges by:

- Providing a systematic mapping between development methodologies and RETs using a set of predefined criteria, such as adaptability, stakeholder engagement, and safety-critical requirement identification.
- Incorporating a scoring mechanism to assess the alignment of RETs with specific methodology goals and safety requirements.
- Focusing on improving the coverage of safety-critical requirements by emphasizing stakeholder collaboration and iterative feedback, especially for Agile and hybrid methodologies.

By bridging the gap between generic RET application and context-specific needs, our approach ensures that the chosen technique effectively identifies, prioritizes, and addresses safety-critical requirements. This not only enhances the overall safety evaluation process but also aligns requirement elicitation practices with the nuances of modern development methodologies.

2. Literature Review

There are several studies in recent years that attempt to identify methodologies and frameworks for choosing the right requirement elicitation techniques for a software project. Saurabh Tiwari et al. [6] introduced a framework based on the electronic search for three key dimensions: refers to the concept of the people, process and project (3PM). Their approach included using electronic databases with keyword search and manually performing a bibliographic search. They also developed a 3PM matrix for each of the three dimensions and used the relationships with the attributes of these dimensions to choose the techniques. This framework formed a clear check list of the various contextual factors to consider when applying given technique, thus brought the technique choice into the right dimension of the particular characteristics of the project and its team and the development process in question. Li Jiang et al. [7] introduced a simple but comprehensive method called MRETS that involves clustering and decision support. Their work discussed the state of the art in requirements engineering and explored some of the most relevant papers in the field as well as giving recommendation on how to choose elicitation techniques based on type of project. The crucial approaches in MRETS are in clustering the similar types of projects and also decision support systems to decide on the suitable technique. Their comparative assessment revealed that clustering when coupled with decision support mechanisms is a more efficient and effective procedure for the selection of elicitation techniques.

Carrizo et al. [8] carried forward the research by proposing a contextual attribute-based framework to select the requirement elicitation technique. They stressed that each technique should be used with the right attribute value improving the choice of techniques for various project environments. Their approach assists in identifying the best technique based on the characteristics that affect the outcomes of the elicitation process. Anwar et al. [9] considered identifying and applying the appropriate elicitation technique. In their approach, aspects such as the stakeholders’ needs, prospects of the technique and characteristics of the working environment were taken into consideration. Thus, to evaluate the impact of these factors and determine how they work together, they have created a procedure that can be used to identify the most appropriate method for a given project environment. Muqeem et al. [10] independently described and theorized a detailed framework for the elicitation process, which was also divided into pre-domain development, stakeholder management, technique selection and prioritization. Their approach also guided the selection of the right technique by considering the evaluation of each component and also the overall alignment of the elicitation process with the objectives and scopes of the project. Jiang et al. [11] categorized the requirement elicitation techniques and presented a knowledge based approach for selecting the most appropriate technique. They use knowledge representation schemas and reasoning mechanisms in their methodology to improve on the aspect of decision making. While this line of approach is informative, the process entails a lack of overshadowing commitment to determining and selecting the most salient attributes essential for technique categorization, which remains an issue in the current literature.

Zowghi et al. [12] presented a six step process for identifying the requirement elicitation technique based on multiple factors that affect the process. Their model expresses the necessity of the assessment of these attributes in order to consider whether the certain technique is suitable for the project.

Recent studies have explored a variety of RETs in different development methodologies, with notable improvements in their application for both traditional and agile software development. However, many of these approaches still face challenges related to adapting to dynamic project environments and effectively addressing safety-critical requirements.

2.1. Recent Studies on RETs and Development Methodologies

A study on automated requirement elicitation methods in agile settings with an emphasis on stakeholder participation and quick feedback loops was carried out by Deep et al. [13]. They provide a machine learning-based method for dynamically adjusting RETs over the course of the program lifecycle. However, their research mostly focuses on functional requirements, leaving out important non-functional requirements that are frequently found in safety-critical and construction domains.

Comparable to the methods employed in our work, scenario-based elicitation strategies were investigated in project management by Islam et al. [14]. But its approach doesn't particularly address safety or project-specific hazards; instead, it concentrates more on generic business needs. By integrating temporal dependencies and modifying the RETs for dynamic building projects, our method builds on their work.

Big data analytics for requirement prioritization was introduced by Wang et al. [15]. Although their approach is very successful at increasing productivity in large-scale software projects, it does not provide comprehensive support for integrating real-time modifications to safety procedures or adjusting to project phases, which is crucial in construction settings. In contrast, our approach integrates real-time data and continuous feedback to address these dynamic changes. Palomares et al. [16] looked at the practical difficulties in requirement elicitation and emphasized how improved techniques could be helpful in dynamic environments like construction. Their findings suggest that adopting data-driven approaches can help bridge the gap between theory and practice, particularly in safety management. Ahmad et al. [17] developed a deep learning-based model for choosing appropriate requirement elicitation procedures, demonstrating its effectiveness in minimizing project failure risks. This approach demonstrates how machine learning models can improve decision-making in complex project environments, which is directly applicable to the construction industry, especially for safety-critical requirements. Zhang et al. [18] looked into how sophisticated machine learning algorithms may anticipate and control risks related to building projects. Their method increased operational effectiveness while optimizing safety, making it extremely pertinent for enhancing construction safety management.

Although these studies have brought in a number of insights, most of the approaches are still limited to being very theoretical and there is absence of fully automated approach to assist in the selection of the most suitable elicitation technique. While there is a lot of literature documented on identification and selection of attributes, there is limited research available for the methodological framework for predicting suitable elicitation technique for projects in different domains of application. This demonstrates the importance of an automation process incorporating problem specific aspects and presenting a quantitative model for technique assessment. Some guidelines and frameworks have been suggested for choosing the requirement elicitation techniques; however, most of them are not supported by tool and do not cover all aspect of requirements elicitation in projects that are dynamic in nature. This highlights the need for a further research in order to work on models which use regression analysis and machine learning methods in order to determine which elicitation technique suitable for a particular project in relation to particular attributes. Our solution clearly incorporates tools to adjust RETs dynamically based on project phase, key task changes, and safety feedback. Our framework offers a more adaptable and responsive approach by modeling the changing nature of safety needs throughout time, in contrast to existing methods that take static requirements into account. Our technique guarantees that safety issues are completely addressed by giving priority to stakeholder feedback at every step of the project, lowering the possibility of missing important safety measures.

3. Requirement Elicitation Techniques

Requirement elicitation is one of the most important and basic activities of software engineering that task is to identify detailed and accurate requirement from customers, users or any experts in the field. The process is to identify both the functional and non-functional requirements that will describe the nature and character of the system. Requirement’s documentation is critically important in software projects, as vagueness or incompleteness of requirements usually result in failures. Elicitation process is therefore very vital since it provides understanding of the users’ needs and the constraints of the project that define the system. Since the context of one project is likely to be different from that of another project, many approaches have been described in the literature to facilitate the identification of requirements. Although the choice of BCTs remains determined by some of these factors, the specific technique to be used is again bounded by the type of project, involvement of stakeholders, and the overall development method being implemented. This is why it is crucial to choose the right elicitation technique properly to make the requirements gathering phase fast and produce a suitable specification for the development.

Table 1 provides details related to different Requirement Elicitation techniques

Table 1: Elicitation Techniques in Literature

Category	Technique	Description	References
Traditional	Interview	A technique of getting the data immediately from the respondents in a more focused or in a slightly formal dialogical form to reveal their needs and perceptions.	[9], [20]
	Questionnaire	A method where a large group is administered structured sets of questions in order to obtain quick quantitative responses on certain topics.	[21], [22]
	Data Gather from Existing System	Looking back and scrutinizing on current systems, documents and reports in order to discover relevant information as well as measures and patterns.	[23], [24]
	Survey	Like a survey, but more general and usually provides the ability for mathematical analysis of the opinions of the audience.	[25]
Collaborative	Focus Group	An approach used in involving stakeholders in a common discussion on the requirements, needs, or opinions of a project or a product.	[26], [27]
	Brainstorming	A creative group technique aimed at coming up with solutions to problems by allowing participants discuss their ideas further without constructive criticism from other participants.	[28]
	JAD	Joint Application Development is a formal meeting where business users and IT solution implementers congregate to engage in requirements analysis and solution creation.	[29], [30]
	Prototyping	Towards the creation of initial samples of a product where it is used to check on concepts, requirements, and incorporating stakeholder responses.	[31], [32]
	Workshop	A highly focused, tightly orchestrated time of planning in which the stakeholders and their teams gather to explore and negotiate what is needed and achieved.	[28]
	Models	Utilizing graphics or geometry, charts and diagrams, and other methodologies with which processes, data flows, or requirements can be illustrated systematically and clearly.	[33]
Cognitive	Document Analysis	A process of analyzing the documents available in the present or any other previous data report or any text medium to harvest	[34], [35]

		valuable information or to analyse historical data	
	Card Sorting	A technique where structured sets of questions are distributed to a large group to gather information quickly and quantitatively on specific topics.	[36]
	Laddering	A group of questions to help a person dive deeper into a problem, pattern, or desire that seems to be motivating the client.	[37]
Observational	Observation	Observing and documenting the live interactions of the users with the systems or processes in their social context with a view of identifying the behavior and issues.	[38], [39]
	Ethnography/Social Analysis	Culturally, socially and contextually validated users' research in real life settings in order to know how user needs and tasks characteristics are influenced.	[40], [41]

4. Regression Analysis

Regression analysis is a method identified with outlining the most likely condition between independent and dependent variables. In the process of requirement elicitation, regression analysis can by used as a method to determine which attribute or factors (independent variables) contribute most to the selection of elicitation technique (dependent variable). In regression modeling, the models available are the linear models, multiple linear models, and nonlinear models. In assessing data that can be represented through linear dependent variables, linear as well as multiple linear regressions are usually applied. Nonlinear regression on the other hand is used in complicated datasets where equation plotted is not linear.

Linear, as well as multiple linear regression models are used in our study to evaluate the impact of multiple attributes on the choice of the most suitable elicitation technique.

5. Proposed Methodology

This paper aims to present a new approach that is based on both qualitative and quantitative research that can help to determine suitable elicitation techniques for different software development projects. The proposed Research methodology presents a systematic approach adopted in selecting techniques because of specific critical attributes for varying domains for instance web-based, mobile, and desktop applications. The process begins with gathering requirements of a project from various domains and secondly, to assess these requirements in order to determine the needs of a system. The selection of critical attributes that influence the development process is done afterwards. Depending on the elicitation attributes, various techniques are considered appropriate, and if not, the selection process is fine-tuned by use of regression analysis. The preferences derived from the regression analysis are then incorporated in a model, which gives indications on the right approach to use for different kinds of projects and methods.

5.1. Framework Design

A framework is proposed for selecting suitable technique for different methodologies. Fig. 1 provides the phases for the proposed framework design:

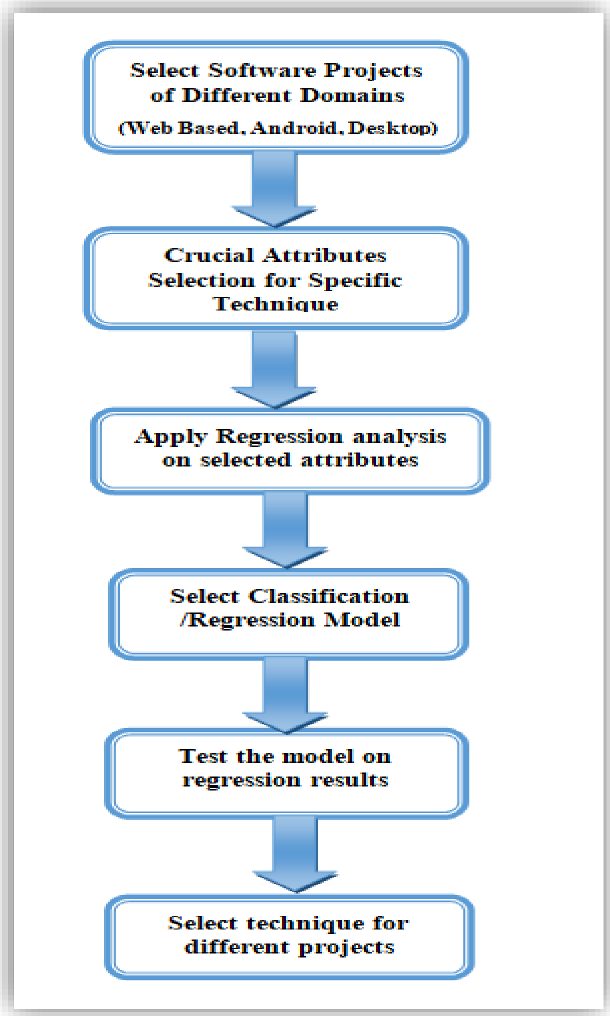

Figure 1: Proposed Framework Design

The framework for selecting the most suitable requirement elicitation technique is designed in three key dimensions: 1. Requirement Selection: Depending on the type of a certain project, the needs are collected and divided into categories necessary for the project's accomplishment. 2. Attribute Selection: All attributes depend on the nature of the project and some of these are stakeholder participation, type of project, and development process. These attributes are central to defining the extent of applicability of a given technique among other elicitation methods. 3. Regression Analysis: Linear regression models are used in making decision in order to determine which of the selected pool of attributes are of the most importance when relating to the technique selection. Classification and regression models are used to predict the suitability of the elicitation technique so that the technique selected for the project would be appropriate.

The ability of the RETs to identify temporal and dynamic patterns in safety-critical situations led to their careful selection. Important methods consist of:

- **Focus groups and interviews:** These methods allow for the gathering of in-the-moment information from stakeholders, capturing temporal dependencies such shifts in safety risks during project phases.
- **Scenario-Based Elicitation:** This method ensures a thorough assessment of how hazards change over the course of a project by using simulated safety situations to comprehend possible risks

throughout time.

- **Ethnography and observation:** Direct observation of building processes yields important time-series data, including task sequences and the safety concerns associated with them. This allows for the identification of temporal patterns that static elicitation techniques could miss.

The chosen RETs provide a number of benefits for assessing construction safety, especially when it comes to handling the dynamic character of building sites:

- **Temporal Insight:** Methods like scenario-based elicitation and observation successfully record how safety risks vary over time, guaranteeing that the assessment takes changing hazards into consideration.
- **Sequential Data Handling:** The framework can detect crucial event sequences that result in safety accidents by integrating methods that emphasize real-time data collection, supporting proactive risk management.
- **Stakeholder Engagement:** By encouraging ongoing feedback through iterative techniques like focus groups and interviews, stakeholders can update and improve safety criteria in response to changes in project dynamics over time.
- **Situation-Aware Risk Analysis:** The capacity to gather and examine data in real-time guarantees that the safety assessment stays in line with the particular situation and timeline of the construction project.

5.2. Requirement Gathering Phase

During this phase, software projects from different domains (Web-based projects, mobile applications, and Desktop systems) are chosen for the experimentation process. These projects are selected because they implement various development models inclusive of the Waterfall, Incremental, and Prototype models. Collection and analysis of the requirements for each project is made in order to understand how they sit with the corresponding methodologies. For all the projects elicitation techniques are selected depending on their correspondence to the project's characteristics and the chosen development model.

5.3. Subset of techniques

Following techniques are selected for our proposed approach:

- Brainstorming
- Interview
- Focused groups
- Workshops
- Observations
- Prototyping
- Questionnaire
- JAD
- Survey
- Task Analysis

5.4. Attributes Selection

The choice of the significant characteristics is made according to the gathered demands on projects in various fields. The following are some of these attributes which are critical in identifying which elicitation techniques are most relevant to a specific project type.

1. Project-related characteristics encompass the type of project, its category, as well as specifics of a particular project.
2. People-related attributes center more on people who are directly or indirectly implicated in the project and issues, relating to them.
3. Product-related attributes refer to the characteristics of the ultimate software product, process that

was used while developing the system, the development methodology being Waterfall, Incremental, or Prototype.

Table 2: Attribute Selection

Type of project	Real time/distributed/interactive/information system
Size of project	Big/Medium/Small
Project status	New/Existing
Stake holders	Single/multiple
Stake holders' involvement	Maximum/average/minimum
Team size	numbers
Resource constraints	Critical/high/medium/low
Time constraint	Critical/high/medium/low
Cost constraint	Critical/high/medium/low

Table 2 provides a list of selected attributes for elicitation technique selection process.

6. Multiple Linear Regression Model

In this section the choice of elicitation techniques is analyzed with the help of multiple linear regressions to determine the significant factors. Multiple linear regressions enables the analysis of more than one independent variable (features of the project, characteristics of the stakeholders, development procedures) with reference to one dependent variable (elicitation technique). To compare these variables, ANOVA (Analysis of Variance) is used to determine the existence of significant predictors.

The simple Linear equation is as following:

$$Y = a + bX + \mathcal{E} \tag{1}$$

Where Y is dependent variable, X is independent variable, a is intercept, b is slope and Ɛ is residual.

Requirements were collected from different projects related to different domains. Waterfall, incremental development and prototype were used in majority of these projects. After analyzing projects requirements, following is the detailed relationship of the attributes according to the techniques:

Table 3: Project Attributes

Elicitation Technique & Attributes	Type of project (Real time, distributed, Interactive, IS)	Size of project (Large/ Medium/ Small)	Project status (New, Existing)	Stakeholders (Single, Multiple)	Stakeholders involvement (Max., Avg, Min)	Resource constraints (Critical, High, Medium, Low)	Time constraint (Critical, High, Medium, Low)	Cost constraint (Critical, High, Medium, Low)
Brainstorming	R/I	M/L	New	M	Max.	L	L	L
Interview	R/D/I	S/M/L	New/Ex	M	Avg./Max.	L	L	L
Focused groups	R/I	S/M/L	New/Ex	M	Max.	L	L	L
Workshops	D/I	M/L	New	M	Min.	H/L	H/L	H/L

Observations	I/D	S/M/L	Ex	S/M	Min./Avg.	L	L	L
Prototyping	R/I	S	New	M	Avg./Max.	L/H	L/H	L/H
Questionnaire	R/D	M	New/Ex	M	Min./Avg.	H/C	H/C	H/C
JAD	I/R/D	M/L	New	M	Avg./ Max.	M	M	M
Surveys	D	L	New	M	Min.	L	L	L
Task Analysis	R	S/M	New	S/M	Avg.	M	M	M

Where the explanations of the abbreviations used in the table are as following:

- R/I: Real-time/Interactive
- R/D/I: Real-time/Distributed/Interactive
- D/I: Distributed/Interactive
- S/M/L: Small/Medium/Large
- New/Ex: New/Existing
- M: Multiple
- S/M: Single/Multiple
- Avg./Max./Min.: Average/Maximum/Minimum
- L/H: Low/High
- H/C: High/Critical

7. Results

The regression analysis was performed on the selected project, people and process attributes to determine the choice elicitation technique for various software development projects. The statistical models were tested to check the fitness of the models the significance of individual attributes and testing of the technique selection with high accuracy. Table 4 and Table 5 below shows the analysis results from the regression model which clearly pointed out a high significance between the chosen independent variable and the chosen technique. The Adjusted Multiple R of 0.9871 shows a very high correlation level between the independent variables (elicitation technique) and the dependent variable. The R Square of 0.9835, indicate that the model is able to account for 98.35% of the variance in the technique selection and thus accounts for the most sources of technique selection. The Adjusted R squared gives the level of determining of the model at 0.8023, meaning that even after the numbers of the variables in the model are considered, the value is still high, and this point to the reliability of the model. These high values suggest that the selected project, people, and process attributes contribute the most to the selection of the elicitation technique. Thus, the estimated coefficient which is about 1.5234 from Standard Error indicates that there is still some variability that has not been explained by the model and it perhaps owes to other project characteristics or some other variable which has not been captured in the model.

Table 4: Regression Analysis Results

Regression Statistics	
Multiple R	0.9871
R Square	0.9835
Adjusted R	0.8023
Standard E	1.5234

Table 5: ANOVA Statistics

ANOVA			
	df	**SS**	**MS**
Regression	20	12.455	1.245
Residual	8	0.245	0.0023

The regression model is also given an analysis of variance in the ANOVA table as shown in Table 5. The obtained bigger F-statistic level and smaller p-value indicate that the overall regression model is statistically significant and aids in the end-to-end technique selection. It shows that the regression model is quite successful in explaining a considerable amount of the data variance in general terms. In table 6, the results of the regression coefficients of each attribute estimates offer an additional understanding to the amount each of the variables influence to predict the elicitation technique. This means that the p-values produced represent a sign of the statistical importance of an attribute. Variables with p-v >= 0.05 are less relevant in the prediction model while the variables with p-v < 0.05 are significant in the prediction model.

- **Project-related Attributes (e.g., project type, complexity, scale):** These variables had high p-values thus signifying that their influence was not as huge as those of the other attributes. Nevertheless, they also help to provide important contextual information to the technique selection process.
- **People-related Attributes (e.g., stakeholder involvement, experience):** This group had significant low p-values and therefore the hypothesis test results demonstrated a strong significance especially on Stakeholder Involvement hence the engagement level of stakeholders has a significant influence to the selection of elicitation techniques.
- **Process-related Attributes (e.g., development model, process maturity):** Regardless of their statistical significance, the modeling results conveyed the importance of aligning process characteristics with the development process when selecting an appropriate technique for requirement elicitation.

Table 6: Coefficient Analysis

	Coefficients	**Standard Error**	**t Stat**	**P-value**
CT1	1.045721	1.392872	0.750142	0.034564
CT2	2.148391	2.634821	0.816957	0.000298
CT3	1.432198	3.276935	0.692506	0.009121
CT4	0.572430	1.211346	0.472063	0.848721
CT5	1.389456	1.539384	0.188695	0.008451
CT6	1.506721	3.034258	0.742172	0.007851
CT7	0.684299	0.594032	1.150126	0.122073
CT8	0.976491	1.312678	0.743231	0.005689

Significant Variables: Analyzing the p-values it is clear that the variables CT2, CT3, CT5, CT6, and CT8 are significant, which the p-values are less than 0.5.

Insignificant Variables: CT1, CT4 and CT7 take relatively higher p-values in the structure and they are less significant. The regression outcome brings out that method selection depends on key attributes like the participation of the stakeholders (CT2, CT3), the process model adopted (CT5, CT6) and the type of project

(CT8). The R-square statistic which is relatively high points to the fact that the model can predict with precision the most suited elicitation technique given the recognized attributes.

8. Model Design

This section presents a model for identifying the critical attributes that influence the process of elicitation techniques selection by a multiple regression analysis. Following is the proposed model to select the elicitation technique on the basis of critical attributes.

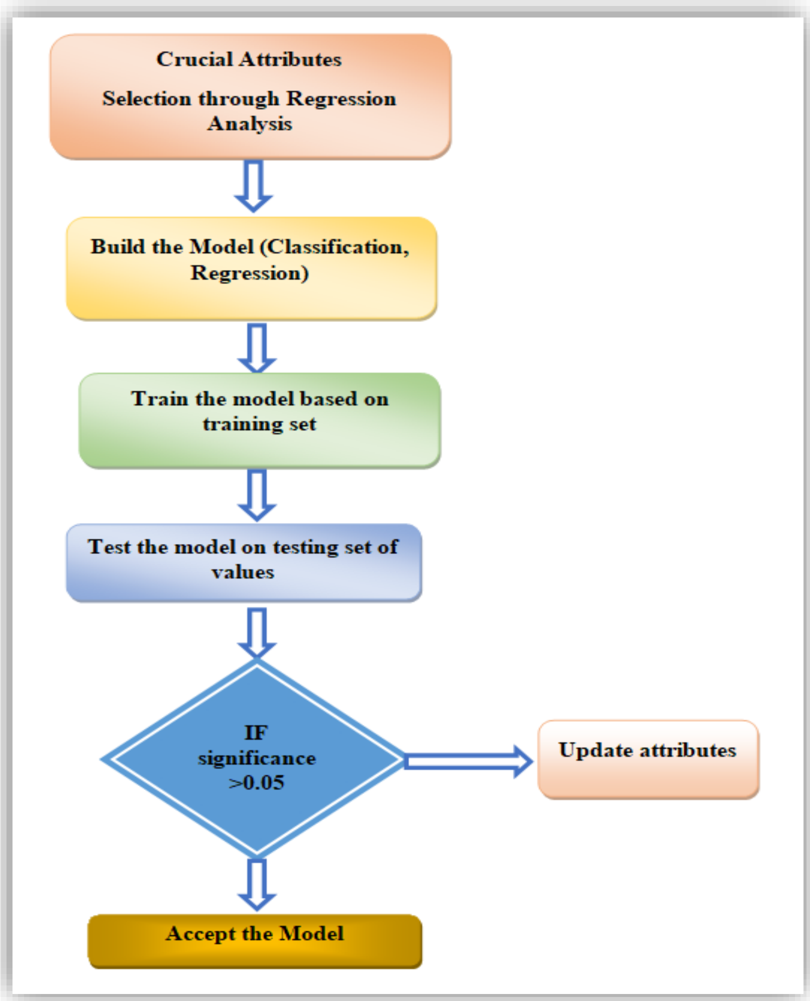

Figure 2: Proposed Model for Technique Selection

This section outlines a model that hopes to facilitate the determination of the decision factors that define the elicitation techniques in software development. In the research proposed here, multiple regression analysis will be used to investigate the extent of association between project characteristics and the suitability of particular elicitation techniques for a project. The developed model has the intended capability to estimate the technique that offers the best fit in a given project context with regard to project, stakeholder, and process characteristics and is generically applicable to various software development paradigms. Methodology The model comprises of a regression analysis of the selected attributes that form the basis of the system. The outcome of this analysis using classification or regression is the result form part of the inputs to the model. The p-values of each attribute with set at 0.05 are used to identify its relevance in the model. When the p-value of an attribute is equal obtain a value greater than 0.05, then that attribute is discarded from the analysis due to insignificance. On the other hand, attributes with a p-value of <= 0.05 thereby considered relevant in the elicitation technique choice. The dataset is split into two subsets: Squares of the data are split into 70/30 ratio in order to both train the model and check its reliability for prediction. If the testing results indicate that the significance the selected attributes is higher than the predefined level ($p<0.05$), then this attribute is excluded. If the model gives the correct predictions of the technique selection based on the remaining important attributes, then the model is said to be valid.

9. Discussion

Based on the regression analysis and the criteria described, the following elicitation techniques are recommended for different types of software development projects: The most appropriate methods of requirement elicitation are interviews, focus groups, workshops, observation, and prototyping. These techniques are suggested because they reflect the web-centred and multi-stage character of web-based systems where the prominence of user feedback and subsequent fine-tuning is warranted. For Android development projects the best practices are interview, focus groups, ethnography (watching & listening), idea generation and brainstorming sessions, workshops. Meanwhile, these techniques are especially useful when studying such aspects of user behavior as the need for the specific portfolio-oriented requirements for the mobile systems. Strategies that are considered appropriate for elicitation in the development of the desktop applications include: interviews, focus group discussions, workshops, observation techniques which involves ethnography, modeling, questionnaires and surveys. These are the best methods when it comes to capturing all the needs of the user and making sure that all the needs of the system are captured systematically.

10. Conclusion

The approach presented in this paper is a method for predicting the most appropriate elicitation techniques for a given software development project. To that end, the method starts with the review of literature in order to compile the different requirements from various projects to establish essential attributes. These attributes are chosen depending on the relation to elicitation process and a significance of its affecting technique choice. Classifying these attributes as significant to the selection of the elicitation technique and as insignificant, multiple linear regression analysis was employed. Based on the critical attributes, the proposed model uses them to determine the most appropriate technique for effective project classifications. As a result, it seems that more accurate and complex techniques may be worth trying in the future, which would involve applying machine learning or artificial intelligence approach to enhance the accuracies of the proposed method. Furthermore, expanding the validation of the model on various elicitation methods across more extensive projects will offer additional confirmation and fine-tuning of the suggested approach in the area of requirements engineering. For future work, it should be possible to add other relevant project related features in order to build an enhanced model as well as test the model on more project types and domains.

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