ABSTRACT

Software product development life cycle, feasibility study is an integral part. Conventionally feasibility study requires dedicated infrastructure and resources that are expensive and only used sporadically. In the growing complexity of business applications it is harder to do feasibility and also to maintain the mimic real environments. Feasibility study tools provides resources which are Unlimited in nature along with flexibility, scalability and availability of distributed feasibility environment, thus it has opened up new opportunities for software feasibility. It leads to cost-effective solutions by reducing the execution time of large project feasibility study. In this paper I propose a new fuzzy mathematical model to attain better scope for feasibility.

Keywords: Fuzzy logic, feasibility, Defuzzification, fuzzy rules, effort estimation

1. Fuzzy Logic

This theory of fuzzy logic will enable the model and the estimation process to handle the vagueness of the information acquired in early phases of a software development project. It will help manage the uncertainty about the precise meaning of linguistic values used by the “experts” when coming up with an estimate.

- In fuzzy precise reasoning is viewed as limiting case of approximate reasoning.
- Every statement has relative degree with which ultimate value be ascribed.
- Any system which can use logic be fuzzyfied.
- Elasticity is associated with all interpretation of knowledge.
- Every opinion how much diverge has place in final interpretation.

2. Feasibility study and software Engineering:

Feasibility study is the important step in any software development process. This is because it makes analysis of different aspects like cost required for developing and executing the system, the time required for each phase of the system and so on. If these important factors are not analyzed then definitely it would have impact on the organization and the development and the system would be a total failure. So for running the project and the organization successfully this step is a very important step in a software development life cycle process. In the software development life cycle after making an analysis in the system requirement the next step is to make analysis of the software requirement. In other words feasibility study is also called as software requirement analysis. In this phase development team has to make communication with customers and make analysis of their requirement and analyze the system. By making analysis this way it would be possible to make a report of identified area of problem. By making a detailed analysis in this area a detailed document or report is prepared in this phase which has details like project plan or schedule of the project, the cost estimated for developing and executing the system, target dates for each phase of delivery of system developed and so on. This phase is the base of software development process since further steps taken in software development life cycle would be based on the analysis made on this phase and so careful analysis has to be made in this phase.
Though the feasibility study cannot be focused on a single area some of the areas or analysis made in feasibility study is given below. But all the steps given below would not be followed by all system developed. The feasibility study varies based on the system that would be developed

3. Fuzzy logic in feasibility study:
There are various factors which affects feasibility analysis. Some of them are as follow Cost Duration of time, Man power, Current technology Operational. Each of the above factors has its own importance. Feasibility analysis contains rigid value there is no place of flexibility but fuzzy gives fuzziness in software engineering. It provides flexibility. Usually team leader works rigidly to test the situation of feasibility but with the help of fuzzy we can analyze whether the project will feasible or not and if not then what will required to complete. Linguistic variables for feasibility of a project or software development (not feasible, feasible, highly feasible)

- Cost implies Economic feasibility.
- Time duration means time to complete the project of making software deadline feasibility.
- 4. Man power means number of person available for the project or software development man power feasibility.
- 5. Operational feasibility

4. IF THEN RULE Inference rule:
we use if then rules in this we convert crisp value to fuzzy value using linguistic variables (not feasible, feasible, highly feasible) if cost is low and man power is high and having enough time to complete and operational feasibility is feasible then project will highly feasible. If cost is high and less time period and also low man power the project will be feasible If cost is too high having less man power and few time period the project will not feasible.

Fig 1: Rules to be fired in decision making

5. Proposed System:
In this paper I took a Nobel approach to study the project feasibility based on some selected input parameters shown below in table with their approximate values.
The parameter under consideration is:

<table>
<thead>
<tr>
<th>Parameter/Value</th>
<th>Very low</th>
<th>low</th>
<th>High</th>
<th>Very high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical capability</td>
<td>0.5</td>
<td>0.75</td>
<td>1</td>
<td>1.89</td>
</tr>
<tr>
<td>Experience of Programmers</td>
<td>0.5</td>
<td>0.91</td>
<td>1.13</td>
<td>1.75</td>
</tr>
<tr>
<td>Product complexity</td>
<td>0.70</td>
<td>0.85</td>
<td>1.20</td>
<td>1.85</td>
</tr>
<tr>
<td>Experience with similar projects</td>
<td>0.85</td>
<td>0.95</td>
<td>1.07</td>
<td>1.50</td>
</tr>
<tr>
<td>Programmer capability</td>
<td>0.5</td>
<td>0.85</td>
<td>1.17</td>
<td>1.84</td>
</tr>
<tr>
<td>Time limit</td>
<td>0.86</td>
<td>0.95</td>
<td>1.25</td>
<td>1.75</td>
</tr>
</tbody>
</table>

Table 1: parameter under project feasibility study

The above parameters shown in table highly influence the project success plus some additional parameters.

6. Software development Efforts Estimation

Software development effort estimates are the basis for project bidding, budgeting and planning. These are critical practices in the software industry because poor budgeting and planning can have dramatic consequences. When budgets and plans are too pessimistic, business opportunities can be lost, while over-optimism may lead to significant losses.

7. Software Sizing

Software sizing is used to estimate the size of a software application or component in order to implement other software management activities. Size is an inherent characteristic of a piece of software just like weight is an inherent characteristic of a tangible object. The accuracy of a software project estimates depends on a number of factors:

- The degree to which the planner has properly estimated the size of the product to be built.
- The ability to translate the size into human effort, calendar time and money.
- The degree to which the project plan reflects the ability of the software team.
- The stability of product requirements and the environment that supports the software engineering effort.

In the context of project planning, size refers to a quantifiable outcome of the software project. With a direct approach, size is measured in Line of Code (LOC). With an indirect approach, Function Point (FP) represents size. Although LOC and FP estimation are distinct estimation techniques, both have a number of characteristics in common.

8. Defuzzyfication method

There are many defuzzyfication rules such as center of gravity, center of sum, max-min value. I used center Segno fuzzy method. In defuzzyfication we convert fuzzy linguistic value to crisp value. With the help of these graphs we can conclude the feasibility estimation. Thus a crisp value of feasibility of project whether it is feasible or not also how much feasible and how much not.
**Fig 2.** Give the inference about the performance of project around 50% projects successful based on the parameters mentioned.

**Fig 3:** there is no guarantee that a project will be successful if the programmer capability is ok but the experience to handle the similar project is very low and the time limit available is also very low.
Fig4: if the programmer is more experienced and time limit a also high only the there is chance a project be successful.

Fig5: based on programmer experience and programmer capability to handle similar project.
9. Conclusion
With the help of fuzzy logic we can easily determine whether the project or software project is feasible or not and also how much feasible and how much not feasible. We can also determine the crisp value of feasibility which lies between 0 and 2.

10. Future scope
I used vary few factors of affecting feasibility of developing software. It’s a prototype I will add maximum amount of factors. Membership graphs are also so limited it will be more justifiable. One can also increase the number of factors to make system more reliable.
11. REFERENCES


