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An Intuitionistic Fuzzy Soft Software Life Cycle Model

S. J. Kalayathankal[1*], J. T. Abraham[2], J. V. Kureethara[3]

[1*] Research and Development Centre, Bharathiar University, Coimbatore, India
[2]Department of Computer Science, Bharatha Matha College, Cochin, Kerala, India
[1]Department of Mathematics and Statistics, Christ University, Bangalore, India

[*]*Corresponding Author: sunnyjoseph2014@yahoo.com, Tel.:* +91-9447302102

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***Abstract* -** Software engineering is a collaborative effort. It involves processes, people and technology. As a massive action, it needs sound evaluation techniques to ensure its efficacy and appropriateness. No software engineering firm look anything lower than the most efficient model. A proper build up will then decide the prospects including the successful completion of the project. This study intends to develop similarity measures between intuitionistic fuzzy soft sets (IFSSs). The proposed model is applied to five software life cycle models (SLCMs) so as to select the most appropriate one.

***Keywords*—**Similarity measure, Software life cycle, Fuzzy decision making, Intuitionistic fuzzy soft sets

I. INTRODUCTION

Our world is a world driven by technology. Machine is indispensable in human life. An efficient machine is governed by a well-engineered software. The human thirst for larger automation, especially, where nations whose population growth is slow, demand efficient softwares and thus powerful machines. Nevertheless, every software made is not perfect.[26] To reach perfection software manufacturers look for means and methods from a 360-degree perspective. The optimally useful software is thus an ever increasing demand. The best example is iPhone. The first-generation iPhone which was released on June 29, 2017, was considered a perfect gadget in those days. In 2017, a decade later, the world had witnessed numerous updations of the operating system, of the software and of the material itself. In line with the research carried out earlier, we now propose a Software Life Cycle Model (SLCM) that will help the software manufacturers to assist in software engineering.

A software has numerous lines of codes and stages of making. It is not a one-man-show. In the design of a software and the life cycle of it, the stages such as the need for the software, its design, coding, testing, deployment and maintenance are to paid utmost attention. The life of a software can be short if proper care is not given in any of the above stages or associated aspects. Of course, humanly it is impossible to bring out a spotless software. Even a nearly perfect software may not last long of it does not get the pulse of the users in updating it.

Our target in this paper is to propose an efficient SLCM. Towards this, we use some of the existing techniques with the help fuzzy Mathematics. The numerous inputs that one obtains in the process of manufacturing and post-manufacturing might not be always crisp. Hence, we use the fuzzy concepts originally proposed by L. A. Zadeh.[11]

The structure of this paper is described below. This paper has five major sections. The current section is Section I that introduces the paper. In Section II, we try to justify the need for this paper by examining the literature. We briefly explain some of the software life cycle models viz., the waterfall model, the incremental model, the V model, the spiral model and the evolutionary prototyping model. In Section III, we bring out the description of the intuitionistic fuzzy set software life cycle model. It also carries values obtained from simulation and the display of computation. Results and Discussion are included in Section IV. Section V consists of conclusion and future directions.

II. RELATED WORK

An industrial model or prototype is a schematic representation of reality. Models are of two types, namely, material model and conceptual model. Among the conceptual models, mathematical models rank high as it gives equations and algorithms for their respective environments. The different step by step procedures of a mathematical model are: identifying the problem, estimating the parameters, identifying the relationship between the parameters, constructing the model, experimentation and analysis and validation of the model.

In the coming paragraphs, we describe some of the existing SLCMs.

*A. **The Waterfall Model***[24]

This was the first model to come up in the early 70's. Rather than being the first model, it is also one of the simplest process models where the phases take a linear structure. Depending on how the activities are ordered and depending on the flow of control between them, there are several kinds of waterfall models developed in the most basic model. The feasibility of the project is analyzed in the first step. Once the feasibility is successfully demonstrated, the second step analyses the tools and essentials for the project and the planning of the methodology of the project begins. On the successful completion of the requirement analysis, the designing process begins. After this, the coding process is done. Now, testing is done on the integrated code which rates the efficiency of the programme. On completion of all these processes successfully, the system is installed. Now, the system can be regularly functioned carrying out the required maintenance. This basic model progressing from analysis, design, coding, testing, implementation and finally support still remains the most basic and most efficient model. The waterfall model is applied only if the system requirements are well defined.

However, following a linear sequence for the ordering of activities has some consequences. Where the phases have begun and where they have ended, seem to have less clarity.A mechanism that can support the proper functioning of this aspect has to be implemented at the end of each level. This will also provide a clearer idea regarding the output at each phase. Obtaining the expected output is mandatory as it can be properly evaluated. Waterfall model suits best for the projects that have well-defined requirements and for the ones that are more precise about their problem domain and tool feasibility.

B. ***The Incremental Model***[6]

The incremental model is created by increments in each phase of the project. It combines waterfall model and prototyping. In this model, a core product is put into the use for an evolutional purpose or used by the customer.

This model works slightly different from the waterfall model where the first increment to be given to the customer for use or to be reviewed is the core product itself without any development. After the reviewing by the customer, the product is analyzed and a plan is developed according to the newer requirements. In the course of evaluation or application by the customer, a plan is developed for an additional increment which could make the software more efficient. Additional features are thus added based on requirements and functionality. These accretions cease when the final product is arrived at.

C. ***The V Model*** [10]

This Model follows on the heels of the waterfall model and as such imitates a sequential path. It necessitates the completion of each step prior to the transition to the next step.In this model, the testing part is given more importance, unlike the waterfall model.

D. ***The Spiral Model*** **[**1**]**

This Model is the combination of prototyping and linear sequential model. This is a newer model proposed by Boehm. Here, the entire procedure is subdivided into several parts of activities where each of them is mentioned to be framework activity which involves different tasks commonly called as task regions. The number of steps involved varies depending on different projects. As the name suggests, the spiral model comes up with a radial dimension and angular dimension where the former represents the cumulative cost incurred in accomplishing work so far and the later represents the progress seen on the completion of each cycle. Each cycle begins with the analysis of the aspects such as finding out the objectives for each cycle, the alternative methods that can be implemented for better accomplishment of these objectives and the existing bounds and constraints. The next step is the evaluation procedure where all these choices are evaluated considering the constraints and specifications in the objective. The evaluation process focuses on the risk management ability of the project, as minimizing the risks maximises the probability for the project to meet the requirements specified in the objective. Involving activities such as benchmarking, simulation, and prototyping, we now develop strategies that can deteriorate the doubts and risks. The spiral model, as it takes into consideration the potential risks involved, is rather considered as a better efficient model for large-scale software development thereby reduces the possibility of crashes.

E. ***The Evolutionary Prototyping Model*** [17]

In this model, we have a prototype which is continually refined until the perfect product is arrived at. Here a better understanding of the system is made available to the client of the project. This is more of a throwaway prototype other than freezing the requirements before designing and coding. Each phase is developed in a vague manner based on the known requirements. Design, coding, testing, etc. are the different stages.

All the above-described models have pros and cons. For a reasonable understanding of SLCM, readers may refer to [14] and [24].

One of the troubles we encounter with decision-making in everyday life is the uncertainty of the certain data we collect to take decisions. Hence, a better decision is always a decision taken after considering all possible aspects of the situation. The classical Multi-Attribute Decision Making (MADM) methods help to a greater level in reaching accurate decisions. However, we cannot completely rely on MADM. This is because of the inefficient handling of inaccurate and inefficient information. In this scenario, fuzzy concepts come to our rescue. Hence, Fuzzy Multi-Attribute Decision Making (FMADM) proves to be a better method to be used in areas like Applied Sciences, Computer Science, Artificial Intelligence, System control, Engineering, Technology and Management.

Fuzzy modeling in decision making is advantageous against the traditional models where observations are mostly rigid and inflexible. Various fuzzy models are used in decision making processes such as ERP System Selection [2], Software Development Strategy Selection [5], Handoff Controller Design [7], Gene Regulator Network [18] and Self-Tuning LQR Controller for Bus Active Suspension [25]. In the field of software engineering, various fuzzy models are used (Integration of Systems [12] and System Modelling [27]).

Molodstov[4] introduced the powerful idea of the soft-set which is capable of solving uncertainties. Maji *et al*. expanded this concept in [15]. In soft sets, the crisp real values are converted into fuzzy values with the help of membership functions (MF).

Atanassov [9] is one who introduced intuitionistic fuzzy sets (IFS). Maji *et al*. [16] extended the concept as intuitionistic fuzzy soft sets. Wu and Su [8] worked on group generalized interval-valued intuitionistic fuzzy soft sets and their applications in decision making. Kalayathankal *et al*. [21] developed the concept of Ordered Intuitionistic Fuzzy Soft Sets. Wood [3] used the intuitionistic fuzzy sets for supplier selection model in the petroleum industry.

In Multi-Criteria Decision Making (MCDM) models fuzzy concept was used by Efe [2], Wood [3] and Wang *et al*. [29] For software development projects, and Ruan [6] used fuzzy concepts. Buyukozkan *et al*. [5] used a fuzzy-multi-criteria decision approach for software strategy selection. For Software Life Cycle models, various kinds of fuzzy approaches are available in [13], [20], [22] and [23].

III. MATERIAL AND METHOD

In the Model we propose for SLCM, we require certain foundational concepts. We mention them in the following paragraphs. We also describe the method used in the model.

Definition 1 [11]**:** Let Y be a universal set. The function μ_B is defined as, μ_B: Y→ [0,1] ....(1)

The function μ_B is called the membership function (MF) and the set defined by it is called the fuzzy set.

Definition 2 [4]**:** Let P(V) be the power set of the universe setVand B⊂G, the variables. Let (F,B) be a soft set over V, where F: B→P(V).

***Example 1*:**

Let V = { $\mathbb{R}_1$, $\mathbb{R}_2$, $\mathbb{R}_3$, $\mathbb{R}_4$, $\mathbb{R}_5$} be the decisions. Let G= {S_1, S_2, S_3, S_4} be the parameters. Suppose that F(S_1)={ $\mathbb{R}_1$, $\mathbb{R}_2$, ℝ4}, F(S_2)= { $\mathbb{R}_3$, $\mathbb{R}_5$},F(S_3)={ $\mathbb{R}_1$, $\mathbb{R}_2$, $\mathbb{R}_3$} and F(S_4)= {$\mathbb{R}_2$, $\mathbb{R}_3$, $\mathbb{R}_5$}.

Table 1. Example of a soft set

V	S_1	S_2	S_3	S_4
$\mathbb{R}_1$	1	0	1	0
$\mathbb{R}_2$	1	0	1	1
$\mathbb{R}_3$	0	1	1	1
$\mathbb{R}_4$	1	0	0	0
$\mathbb{R}_5$	0	1	0	1

Definition 3 [15]: Let P (V) the set of all fuzzy sets of the universe set V and B ⊂ G, the variables. (F, B) is a fuzzy soft set (FSS) over V, where F: B →P(V).

Table 2. Example of FSS

V	S_1	S_2	S_3	S_4
$\mathbb{R}_1$	0.7	0.4	0.7	0.8
$\mathbb{R}_2$	05	0.6	1	0.6
$\mathbb{R}_3$	0.3	0.4	0.9	0.3
$\mathbb{R}_4$	0.9	0.45	0.5	0.55
$\mathbb{R}_5$	0.8	0.3	0.4	0.65

Definition 4 [9]**:** An Intuitionistic Fuzzy Set (IFS) is defined as C= $\left\{\langle y, \left((\mu_c(y)), \nu_c(y) \right) \rangle \mid y \in G \right\}$ ….................….....(2)

where μ_C: G→[0,1] and ν_C: G→[0,1]. The functions μ_C and ν_C are called membership value (MV) and non-membership value (NV), respectively. It is to be noted that $0 \le \mu_C(y) + \nu_C(y) \le 1$, $\pi_A(y) = 1 - \mu_C(y) - \nu_C(y)$, $0 \le \pi_C(y) \le 1$. This is called the in-deterministic part for y.

Definition 5 [16]**:** Let P(V) be the set of all IFSs of the universe set V. Let B⊂G, the variables. (F, B) is an IFSSs over V, where F: B→P(V).

***Definition 6*:** If $\mu_A(x)$ and $\nu_A(x)$ are the MVand NV of the element x to the set A, then

$$\nu_A(x) = \begin{cases} \dfrac{0.5*\alpha\left[1-\mu_A(x)\right]}{\max\left[\mu_A(x), 1-\mu_A(x)\right]} & if \quad \mu_A(x) \ge 0.5 \\ \dfrac{0.5*\alpha\left[1-\mu_A(x)\right]^2}{\min\left[\mu_A(x), 1-\mu_A(x)\right]} & if \quad 0 < \mu_A(x) < 0.5 \\ 1 & if \quad \mu_A(x) = 0 \end{cases}$$

where α is a dominating fuzzy index and $0 \le \alpha \le 1$.

***Definition 7*:**

If C and D are any two IFSSs of the set G, then
$\overline{C} = \left\{ \langle y, \left(\nu_C(y)\right), \left(\mu_C(y)\right) \rangle \mid y \in G \right\}$

$C \cap D = \{\langle y, \min[(\mu_C(y)), (\mu_D(y))], \max[(\nu_C(y)), (\nu_D(y))]\rangle | y \in G\}$

$C \cup D = \{\langle y, \max[(\mu_C(y)), (\mu_D(y))], \min[(\nu_C(y)), (\nu_D(y))]\rangle | y \in G\}$

$C + D = \{\langle y, (\mu_C(y)) + (\mu_D(y)) - (\mu_C(y)) \cdot (\mu_D(y)), (\nu_C(y)).(\nu_D(y)) | y \in G\}$

$C \ . D = \{\langle y, (\mu_C(y)) \cdot (\mu_D(y)), (\nu_C(y)) + (\nu_D(y)) - (\nu_C(y)).(\nu_D(y))\} | y \in G\}$

***Definition 8*:**

Let $(Super)$ be the Super Intuitionistic Fuzzy Soft Set (SIFSS) of Y. Then $(Super)$ is called SIFSS of Yif $(\mu_{Super}(y)) = 1, (\nu_{Super}(y)) = 0$ *and* $\pi_{Null}(y) = 0, \forall y \in Y$.

Definition 9 :

Let $(Null)$ be the Null intuitionistic fuzzy soft set (NIFSS) of Y. Then $(Null)$ is calledNIFSS of Y if $(\mu_{Null}(y)) = 0$, $(\nu_{Null}(y)) = 1$ and $\pi_{Null}(y) = 0$, $for\ all\ y \in Y$.

$\boldsymbol{Definition}$ **10**: Let G = $\{z_1, z_2, ..., z_n\}$ be the universe of discourse. Let Q and R be two IFSs in G, Where

$$Q = \{\langle z, (\mu_Q(z)), (\nu_Q(z))\rangle | z \in G\}$$

$$R = \{\langle z, (\mu_R(z)), (\nu_R(z))\rangle | z \in G\}$$

Modified similarity measure between IFSs Q and R is denoted by $Ʈ_{d_1}(Q, R)$ and is defined as

$$Ʈ_{d_1}(Q, R) = 1 - \sqrt{\frac{1}{3m}\sum_{i=1}^{m}[|P(i)| + |M(i)| + |L(i)|]}$$

where m is the number of parameters of the system.

$P(i) = (\Phi_Q(z_i)) - (\Phi_R(z_i))$

$M(i) = (\mu_Q(z_i)) - (\mu_R(z_i))$,

$L(i) = (\nu_Q(z_i)) - (\nu_R(z_i))$

$$(\Phi_Q(z_i)) = \frac{(\mu_Q(z_i)) + 1 - (\nu_Q(z_i))}{2}$$

$$(\Phi_R(z_i)) = \frac{(\mu_R(z_i)) + 1 - (\nu_R(z_i))}{2} \quad \text{where } z_i \in G$$

$\boldsymbol{Definition}$ **10:**

$$Ʈ_{d_2}(Q, R) = 1 - \frac{1}{2m}\sum_{i=1}^{m}[|P(i)| + |M(i)| + |L(i)|]$$

Where m is the number of parameters of the system.

$P(i) = (\mu_Q(z_i)) - (\mu_R(z_i))$,

$M(i) = (\nu_Q(z_i)) - (\nu_R(z_i))$

$L(i) = (\pi_Q(z_i)) - (\pi_R(z_i))$

$\boldsymbol{Definition}$ **10**:

$$Ʈ_{d_2}(Q, R) = \frac{\sum_{i=1}^{m}[|H(i)| + |K(i) + |J(i)]}{\sum_{i=1}^{m}[|U(i)| + |V(i) + |W(i)]}$$

Where

$H(i) = \min[(\mu_Q(z_i)), (\mu_R(z_i))]$

$K(i) = \min[(\nu_Q(z_i)), (\nu_R(z_i))]$

$J(i) = \min[\pi_Q(z_i), (\pi_R(z_i))]$

$U(i) = \max[(\mu_Q(z_i)), (\mu_R(z_i))]$

$V(i) = \max[(\nu_Q(z_i)), (\nu_R(z_i))]$

$W(i) = \max[\pi_Q(z_i), (\pi_R(z_i))]$

Remark 1: $0 \le Ʈ_{d_k}(J, K) \le 1$.
Remark 2: $Ʈ_{d_k}(K, K) = 0$
Remark 3: $Ʈ_{d_k}(J, K) = Ʈ_{d_k}(K, J)$.

Remark 4: $Ʈ_{d_k}(J, K) = 1$ if and only if $J = K$
i.e., $(\mu_J(x_j)) = (\mu_K(x_j))$ and $(\nu_J(x_j)) = (\nu_K(x_j))$ for any $x_j \in G$.

Remark 5: $Ʈ_{d_k}(J, K) = 0$ and $Ʈ_{d_k}(J, R) = 0$, then $Ʈ_{d_k}(K, R) = 0$.

***Definition15*:**
Let J and K are any two IFSSs of G. Then J is dominate K if

$$Ʈ_{d_k}((Super), J) \ge Ʈ_{d_k}((Super), K)$$

A. The Similarity Measure Algorithm

This algorithm computes the optimum output of the fuzzy modeling. The three important processes of the fuzzy modeling are fuzzification, fuzzy computation and de-fuzzification.

1. Identify relevant parameters$(\mathbb{R}_m)$.
2. Identify appropriate Models$(Ж^n)$
3. Construct OIFSS$Ж^n$
4. Calculate $\pi_{Ж^n}(\mathbb{R}_m)$
5. Calculate$Ʈ_{d_k}((Super), Ж^n)$
6. Compute$Ж^n$ using the relation

$$Ʈ_{d_k}((Super), Ж^n) = \max_{i} Ʈ_{d_k}((Super), Ж^n)$$

7. If $Ж^n$ is not unique, choose that one corresponding to which $\sum_m \sum_{r=1}^{n} \pi_{\pi_{Ж^r(\mathbb{R}_m)}}$ is maximum

8. The optimum is $Ж^n$.

IV. RESULTS AND DISCUSSION

Here, we present an application for the selection of an SLCM based on the proposed model, shown in Table 3. Having taken advice from the well-informed in the field and keeping in mind the specific needs of the project five SLCM variants are proposed. These models are Spiral Model, V Model, Evolutionary Prototyping Model, Incremental Model and Waterfall Model which are denoted by $Ж^1$, $Ж^2$, $Ж^3$, $Ж^4$and $Ж^5$, respectively. The three main criteria are people, process, and technology. The twelve parameters of the above three main criteria are better manageability, user involvement and feedback, complexity, flexibility, criticality, cost, reusability and documentation, requirements management, focus on design and architecture, software quality, testing and integration, and formal reviews. The proposed model involves five software engineering paradigms and 12 parameters. The parameters are denoted by $\{\mathbb{R}_m\}$ from = 1 to 12.

The OIFSSs are
$\{\mathbb{R}_1\}$={$Ж^1$/(0.7, 0.107), $Ж^2$/ (0.6, 0.2), $Ж^3$/ (0.6, 0.2), $Ж^4$/(0.9,.056), $Ж^5$/ (0.5, .25)},
$\{\mathbb{R}_2\}$={$Ж^1$/ (0.7, 0.199), $Ж^2$/ (0.8, 0.1), $Ж^3$/ (0.9, 0.056), $Ж^4$/ (0.6, 0.33), $Ж^5$/ (0.9, 0.056)},
$\{\mathbb{R}_3\}$={$Ж^1$/ (0.8, 0.1), $Ж^2$/ (0.8, 0.1),$Ж^3$/ (1, 0), $Ж^4$/ (0.7, 0.199), $Ж^5$/ (0.8, 0.1)},
$\{\mathbb{R}_4\}$={$Ж^1$/ (0.9, 0.056), $Ж^2$/ (0.9, 0), $Ж^3$/ (1, 0), $Ж^4$/ (0.8, 0.1), $Ж^5$/ (0.9, 0.056)},
$\{\mathbb{R}_5\}$={$Ж^1$/ (1, 0), $Ж^2$/ (0.5, 0.1), $Ж^3$/ (1, 0), $Ж^4$/ (0.5, 0.3),$Ж^5$/ (0.5, 0.3)},
$\{\mathbb{R}_6\}$={$Ж^1$/ (0.5, 0.4), $Ж^2$/ (1, 0), $Ж^3$/ (1, 0), $Ж^4$/ (0.5, 0.4),$Ж^5$/ (0.5, 0.4)},
$\{\mathbb{R}_7\}$={$Ж^1$/ (0.5, 0.4), $Ж^2$/ (0.6, 0.2),$Ж^3$/ (1, 0), $Ж^4$/ (0.4, 0.427), $Ж^5$/ (0.9, 0.056)},
$\{\mathbb{R}_8\}$={$Ж^1$/ (0.8, 0.1), $Ж^2$/ (0.8, 0.1), $Ж^3$/ (1, 0), $Ж^4$/ (0.7, 0.199), $Ж^5$/ (0.8, 0.1)},
$\{\mathbb{R}_9\}$={$Ж^1$/ (1, 0), $Ж^2$/ (0.5, 0.1), $Ж^3$/ (1, 0), $Ж^4$/ (0.5, 0.3), $Ж^5$/ (0.5, 0.3)},
$\{\mathbb{R}_{10}\}$={$Ж^1$/ (0.5, 0.4), $Ж^2$/ (0.6, 0.2), $Ж^3$/ (1, 0), $Ж^4$/ (0.4, 0.427), $Ж^5$/ (0.9, 0.056)},
$\{\mathbb{R}_{11}\}$={$Ж^1$/ (0.7, 0.107), $Ж^2$/ (0.6, 0.2), $Ж^3$/ (0.6, 0.2), $Ж^4$/ (0.9, 0.056), $Ж^5$/ (0.5,0.25)},
$\{\mathbb{R}_{12}\}$={$Ж^1$/ (0.5, 0.4), $Ж^2$/ (1, 0), $Ж^3$/ (1, 0), $Ж^4$/ (0.5, 0.4), $Ж^5$/ (0.5, 0.4)}.

The output of the fuzzy computing model is

$Ʈ_{d_1}((Super), Ж^1)$= 0.5098,
$Ʈ_{d_1}((Super), Ж^2)$= 0.5623,
$Ʈ_{d_1}((Super), Ж^3)$= 0.7623,
$Ʈ_{d_1}((Super), Ж^4)$= 0.4219,
$Ʈ_{d_1}((Super), Ж^5)$= 0.5043,
$Ʈ_{d_2}((Super), Ж^1)$= 0. 7084,
$Ʈ_{d_2}((Super), Ж^2)$= 0.7250,
$Ʈ_{d_2}((Super), Ж^3)$= 0.9250,
$Ʈ_{d_2}((Super), Ж^4)$= 0.6167,
$Ʈ_{2}((Super), Ж^5)$= 0.6875,
$Ʈ_{d_3}((Super), Ж^1)$= 0. 5483,
$Ʈ_{d_3}((Super), Ж^2)$= 0.5686,
$Ʈ_{d_3}((Super), Ж^3)$= 0.8604,
$Ʈ_{3}((Super), Ж^4)$= 0.4457,
$Ʈ_{3}((Super), Ж^5)$= 0.5221,

The optimum decision is $Ж^3 > Ж^2 > Ж^1 > Ж^5 > Ж^4$.
Evolutionary Prototyping > V Model > Spiral > Incremental Model > Waterfall Model.

Table 3. Intuitionistic Fuzzy Soft Set

V	$Ж^1$	$Ж^2$	$Ж^3$	$Ж^4$	$Ж^5$
$\mathbb{R}_1$	(0.7,107)	(0.6,0.2)	(0.6, 0.2)	(.9,0.056)	(0.5,0.25)
$\mathbb{R}_2$	(.7,.199)	(0.8,0.1)	(.9, .056)	(0.6,0.33)	(0.9,.056)
$\mathbb{R}_3$	(0.8,0.1)	(.8,0.1)	(1.0,0.0)	(0.7,0.199)	(0.8, 0.1)
$\mathbb{R}_4$	(0.8,.056)	(0.9,0.0)	(1.0,0.0)	(0.8,0.1)	(0.9,0.056)
$\mathbb{R}_5$	(1.0,0.0)	(0.5,0.1	(1.0,0.0)	(0.5,0.3)	(0.5, 0.3)
$\mathbb{R}_6$	(0.5,0.4)	(1.0,0.0)	(1.0,0.0)	(0.5,0.4)	(0.5,0.4)
$\mathbb{R}_7$	(0.5, 0.4)	(0.6,0.2)	(1.0,0.0)	(0.4,0.427)	(0.95,.056)
$\mathbb{R}_8$	(0.8,0.1)	(0.8,0.1)	(1.0,0.0)	(0.7,0.199)	(0.8,0.1)
$\mathbb{R}_9$	(1.0,0.0)	(0.5,0.1)	(1,0.0)	(0.5,0.3)	(0.5,0.3)
$\mathbb{R}_{10}$	(0.5, .4)	(0.6,0.2)	(1.0,0.0)	(0.4,.427)	(0.9,0.056)
$\mathbb{R}_{11}$	(.7,0.107)	(0.6,0.2)	(.6, .2)	(0.9,0.056)	(0.5,0.25)
$\mathbb{R}_{12}$	(0.5,0.4)	(1.0,0.0)	(1,0.0)	(0.5,0.4)	(0.5,0.4)

A. *Analysis*

In this work, we developed an IFSS model to select an appropriate SLCM. The similarity measures are applied to five selected system life cycle models in Software Engineering. The membership, non-membership and indeterministic grades are assigned to each parameter. The increase in the number of parameters (weight of membership and non-membership) makes the model structurally more stable.

In providing the system with enhanced capabilities so as to make it applicable to a universalized scheme, the IFSS model takes into consideration a computational model which computes elements within the set as well as a universal super intuitionistic fuzzy set. This offers a comprehensive all-inclusive perfect model to which other less comprehensive models can be compared and analyzed so as to provide greater reliability and applicability.

The cumulated measure $\daleth_{d_k}((Super), Ж^n)$ is analyzed on the basis of its dependability. Identical outputs are generated by the application of either of the proposed similarity measures. The choice of parameters play a critical role in the SLCM selection.

V. CONCLUSION and Future Scope

The optimum solution is $Ж^3$. This finding reveals that the Evolutionary Prototyping model has the largest computational value, $\daleth_{d_k}((Super), Ж^n)$ and hence it is the most suitable one. Hence, according to the Intuitionistic Fuzzy Soft Software Life Cycle Model proposed in this paper, the Evolutionary Prototyping mode is recommended. Of course, the set conditions may vary in a different analysis. Hence, readers may be cautious about closely following the conditions set by us in order to trust our judgement. This study must enable more serious studies for the researchers and industrialists to rigorously work towards achieving a better sustainable model not just in software life cycle model but also in other areas as well.

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Authors Profile

Dr. S. J. Kalayathankal received the MSc, MPhil and PhD (Mathematics) from Kerala University, Kerala, India (1986), BEd from Calicut University, Kerala, MCA from IGNOU, India (2002), M.Tech IT from Karnataka State Open University (2013) and presently doing his second Ph.D. in Computer Science from Bharathiar University, Coimbatore, India. He is currently the Head of the Department and Associate Professor in the Department of Mathematics, K.E.College, Mannanam, M. G. University, India. He has 30 years of teaching experience. He has published 50 papers in the areas of Fuzzy modeling and decision making, Graph theory and Applied Mathematics.

Dr. J. T. Abraham(M.Tech(IT), M.C.A., M.Sc, M.Phil, Ph.D.) is an Assistant Professor of Computer Science at Bharatha Matha College, Ernakulam since June 2012. He has 22 years of professional experience, inclusive of academic, research and extension activities and administrative. He has 30 research articles and 3 books to his credit. His recent book –"Thenthulli-Keys to Successful life" got high media coverage. He appeared as a guest on TV programmes in Asianet, JaiHind TV and Powervision. He is a research guide. As a noted academician with global exposure, he worked as Faculty in the Information Technology of Misurata University, Libya for two years. He worked as a guest lecturer at the University of Muscat. He gave talks at National and International Conferences.

Dr. J. V. Kureethara has MSc Mathematics and MA Economics from Madras University and has received his Ph.D. in Mathematics from MS University, Tirunelveli, India in 2010. He is currently an Associate Professor in the Department of Mathematics, Christ University, Bangalore, India. He is the Mathematics issue editor of *Mapana* Journal of Sciences and reviewer of many Mathematics Journals. He is the author forty-eight articles in the fields of Graph Theory, Number Theory, Church History, Sacred Liturgy and Sports both in English and Malayalam. He is an active blogger with more than 120 thousand pageviews. He is the co-editor of two books.

