

# STAKEFINDER – AN IMPROVED STAKEHOLDER IDENTIFICATION TECHNIQUE USING RECURRENCE VALUE

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**Abstract :** Stakeholder identification is important activity in requirements engineering. Stakeholder identification and prioritization is equally difficult as gathering the requirements from the users in the software development life cycle. After identifying the stakeholders, they need to be prioritized according to the impact they have on the system. StakeRare is a method that uses social networks and collaborative filtering to identify and prioritize requirements in software projects. StakeRare uses Page Ranking method to identify stakeholders and asks them to recommend other stakeholders and stakeholder roles. Then a social network is built with stakeholders as nodes and their recommendations as links, and prioritizes stakeholders using a variety of social measures to determine their project influence. In this paper a new method is proposed, Stakefinder which is an improved version of StakeRare using a new measure called recurrence value which will be used to finalize and prioritize the stakeholders. Recurrence value of a stakeholder is nothing but the number of times a stakeholder is recommended by others. That is, if you are a stakeholder you can recommend other stakeholders whom you think are important for the project.

**IndexTerms - Stakeholder, Social Network, StakeRare, Stakefinder, Recurrence Value, Page Ranking.**

## I. INTRODUCTION

A stakeholder is a person or group that has an interest or share in a business or enterprise (originally, it meant the holder of the bets in a game). [1]. Macaulay defined stakeholders as “all those who have a stake in the change being considered, those who stand to gain from it, and those who stand to lose” Today, we define the term as follows:” A stakeholder is a person or organization who influences a system’s requirements or who is impacted by that system”. Frequently, roles are used instead of individuals. Typical stakeholder roles in any software project are-end user, client, architect, developer, tester, quality engineer, project manager, product manager, operator, and maintainer. Meanwhile, the term stakeholder is also used in other fields for a person or organization that has an interest in the outcome of, or is impacted by, a project, service, or decision. It is important to distinguish between influencers and stakeholders because while some potential stakeholders may indeed be both stakeholders and influencers, some who have a real stake in an enterprise may have no influence, e.g. a job applicant, while some influencers may have no stake, e.g. the media [4]. Categories of stakeholder include end-users, managers and others involved in the organizational processes influenced by the system, engineers responsible for system development and maintenance, customers of the organization who will use the system to provide a service, external bodies such as regulators, domain experts, and so on. They will each have different goals, and will try to satisfy their own without recourse to others [5]. Cotterell and Hughes [6] suggest that stakeholders might be in one of three categories: internal to the project team; external to the project team, but internal to the organization; and external to both the project team and the organization. There are different categories of stakeholders and different levels of impact on the project. Some stakeholders have lesser impact and some have greater impact. Firstly, we need to identify those who are directly linked to the project and also indirectly linked to the project. Directly affected stakeholders will usually have greater influence and impact of a project than those indirectly affected. While these details are developed and analyzed further in the Stakeholder Analysis process[7]. StakeRare, a new method that uses social networks and collaborative filtering to identify and prioritize requirements in large software projects. StakeRare identifies stakeholders and asks them to recommend other stakeholders and stakeholder roles, builds a social network with stakeholders as nodes and their recommendations as links, and prioritizes stakeholders using a variety of social network measures to determine their project influence. As each measure ranks the nodes in the network differently, they prioritize different kinds of stakeholders. PageRank is one of the social network measures that are used to prioritize the stakeholders. PageRank ranks stakeholder in terms of stakeholder’s relative importance to all other stakeholders. In this measure stakeholders who are strongly recommended by many salient stakeholders are salient, and the recommendations of a highly salient stakeholder deserve more weight, which, in turn, makes their recommended stakeholders salient. PageRank interprets edge values directly as strength of recommendation, hence they use salience as edge weights. PageRank is used because this is one of the most accurate measures [8]

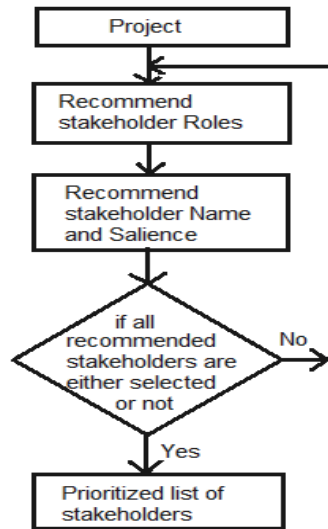


Figure (1)- System Flow Chart



Figure (2)— Stake Rare Steps

3.1 STAKERARE STEPS

Table 1: StakeNet Concepts

Concept	Definition
Scope	The work required for completing the project successfully [17].
Stakeholder	An individual or a group who can influence or be influenced by the success or failure of a project [14].
Stakeholder role	A part the stakeholder plays in the project.
Stake	An interest, investment, share, or involvement in the project, as in hope of gain.
Saliency	The level of influence a stakeholder has on the project [11]. Stakeholders with high saliency are crucial to project success; stakeholders with low saliency have marginal impact.

Table 1 – Stake Net Concepts

Step 1:- Identify and Prioritize Stakeholders-Find Initial Stakeholder, Initial and newly identified stakeholder provide recommendation. StakeRare builds social network Using Snowball Approach. Recommendation is done in following way

<Stakeholder, Stakeholder Role, Saliency>

StakeRare prioritize stakeholders and roles. It applies social network measures such as betweenness centrality, closeness centrality to prioritize stakeholder. Stakeholder are prioritize using highest score of saliency

Step 2:- Collect Profile- Prioritized stakeholders provides preferences on the initial requirement and other requirements. Preference is being done in following way

<Stakeholder, requirement, rating>

StakeRare propagates the requirements as well as ratings by stakeholders.

Step 3:- Predict Requirement-StakeRare applies collaborative filtering algorithms on profiles to predict requirements. StakeRare recommends requirements that may be relevant to the stakeholder's .Stakeholders rate recommended requirements

Step 4:- Prioritize Requirement-StakeRare aggregates all stakeholders profiles into a prioritize list of requirements. Requirement prioritization could be done through two approaches,

- Pair wiseComparison
- Binary Searchtree

So then we obtain prioritized lists of requirement. RALIC was a software project at the University College London which stands for Replacement Access, Library and ID Card. By applying StakeNet to the RALIC, the authors have demonstrated that StakeNet performs better than the existing method, with a higher precision in identifying stakeholders and their roles [8].

**II. PROPOSED METHOD**

A new method is proposed to identify stakeholders using a new measure called Recurrence value instead of PageRanking. Recurrence value of a stakeholder is nothing but the number of times a stakeholder is recommended by others. That is, if you are a stakeholder you can recommend other stakeholders whom you think are important for the project. There is noneed of giving a salience value. Thus the person who is most recommended will get more priority. For example, consider figure (3). Inthe figure, Alice is recommended by Bob, Carol, and Dave. Thus recurrence value of Alice is 3. Bob is recommended by only Alice and hence his recurrence value 1. Same way the number of arrows pointing to Carol are 2 and Dave is 1. Hence their recurrence value is 2 and 1respectively.

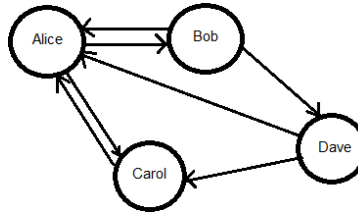


Figure (3) –Stakeholder Recommendation using recurrence value

In case, more than one stakeholder is having the same recurrence value, the stakeholder recommended by the person who has more recurrence value is given more priority. Thus the problem is solved. For example, consider figure (a). Here Bob and Dave have the same recurrence value 1. But Bob is recommended by Alice, who is having a recurrence value 3 and Dave is recommended by Bob whose recurrence value is 1. Hence Bob is given more priority than Dave. Thus from the figure the prioritized list of stakeholders is

Stakeholder	Recurrence Value
Alice	3
Carol	2
Bob	1
Dave	1

Table 2-Stakeholder based on Recurrence value

Thus recurrence value avoids the disadvantages and confusions created by PageRank measure. Recurrence value can be considered as a more accurate measure StakeRare uses one of the most accurate social measure called PageRank measure to prioritize stakeholders. It works based on salience value, which has got a lot of disadvantages. So if the salience value goes wrong it severely affects the result. In order to avoid the faults caused by salience value, a new measure called Recurrence value is introduced. PageRank, the social measure used by StakeRare uses salience value. In order to avoid the faults caused by salience value, a new measure called Recurrence value is introduced. In this measure, stakeholders are prioritized purely based on the number of times they are recommended.

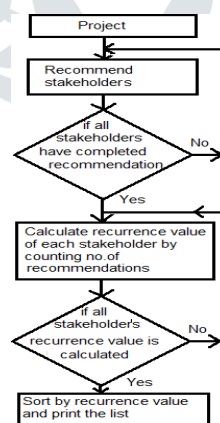


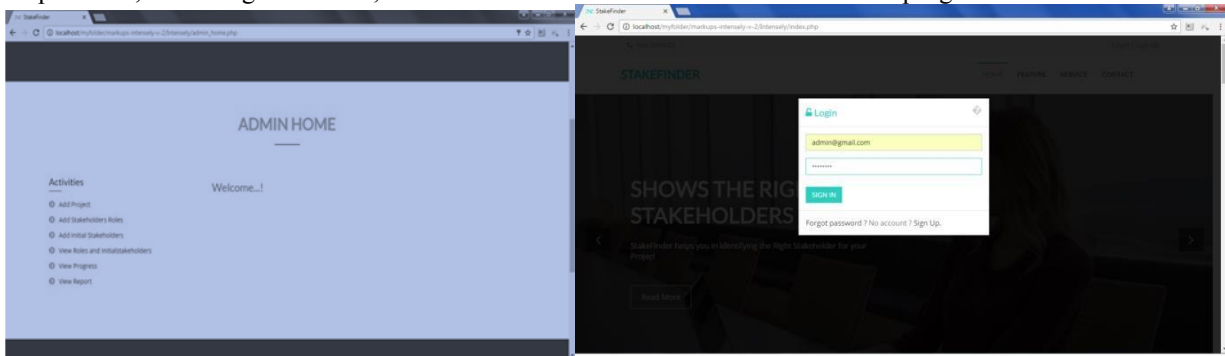
Figure (4)-Proposed method system chart

**III. IMPLEMENTATION OF PROPOSED METHOD**

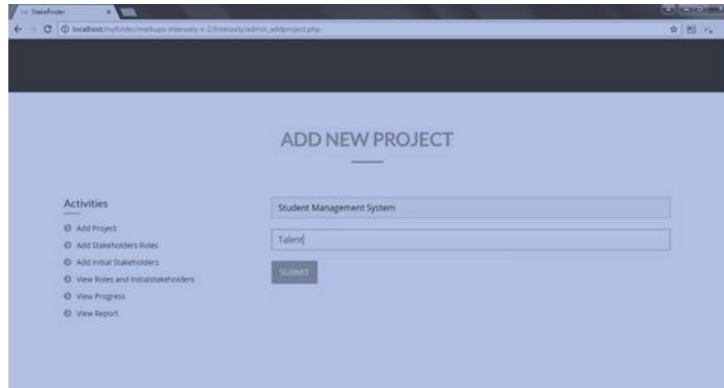
StakeFinder is a website that helps in identifying and prioritizing the right stakeholders for a project. The users of StakeFinder are Admin and Stakeholders. The admin add initial stakeholder roles and stakeholders and invite other stakeholders to the system. The stakeholders can also recommend stakeholder roles, new stakeholders and invite them to the system. After all the stakeholders have completed their recommendation, admin can generate the prioritized list of stakeholders using two methods- PageRank and Recurrence value. This system will provide an interface using PHP(Version 5.3) as front end and

MySQL (Version 5.5) as back end to store data. We can use StakeFinder either as a website or a Desktop application. If we host StakeFinder then, it will act and run as a website.

Step 1: First, admin login. For that, click on the 'LOGIN/SIGN UP' button on the top right corner.



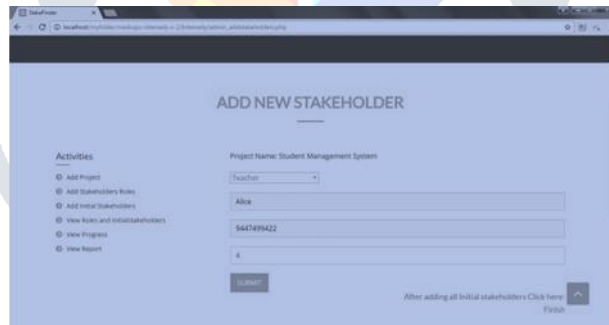
Step 2: The admin can add the project in the Add Project form.



Step 3: Then the admin adds the initial stakeholder roles. For that select the project, whose initial stakeholders are being added and add initial roles.

Step 4: When all initial stakeholder roles are added click on 'FINISH' button on the bottom of the form, which directs you to add the initial stakeholders.

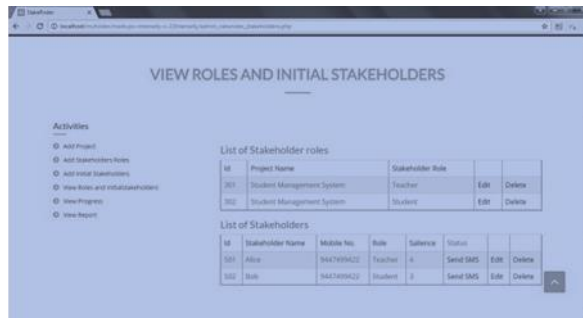
Step 5: Now to add all initial stakeholders, first select the project. Then continue adding new stakeholders.



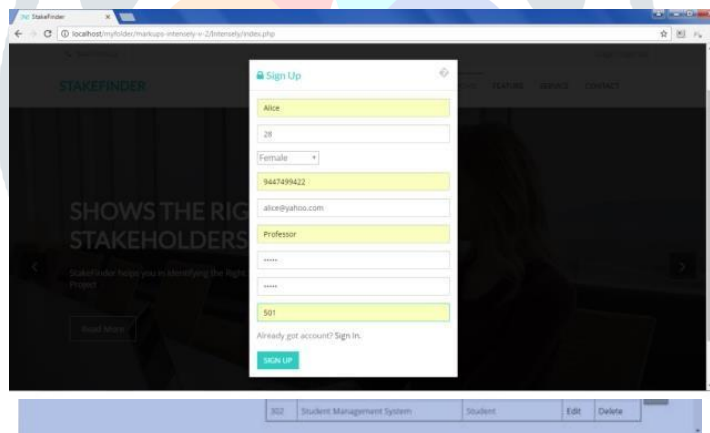
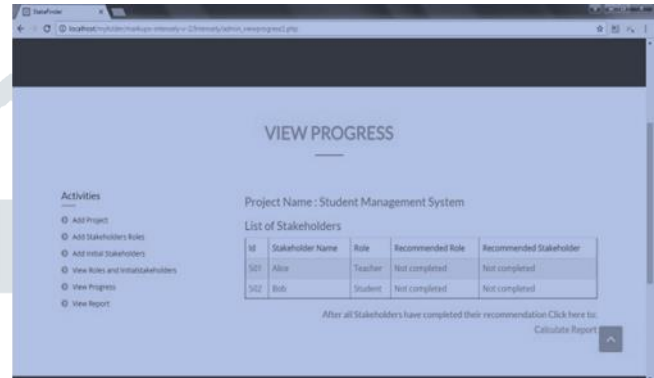
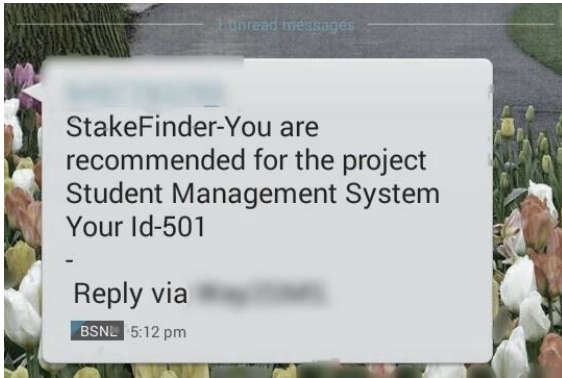
Step 6: Once you finish adding all initial stakeholders, click on the 'FINISH' button on the bottom of the form



Step 7: Now we can invite newly added stakeholders. For this we have to select the project, and then click on the 'SEND SMS' button for the respective stakeholder. After clicking on 'SEND SMS', that particular stakeholder will get a message saying 'You are recommended for the project- Student Management System'. The message also contains his 'Stakeholder id' which is required for him to sign up and login into the system.



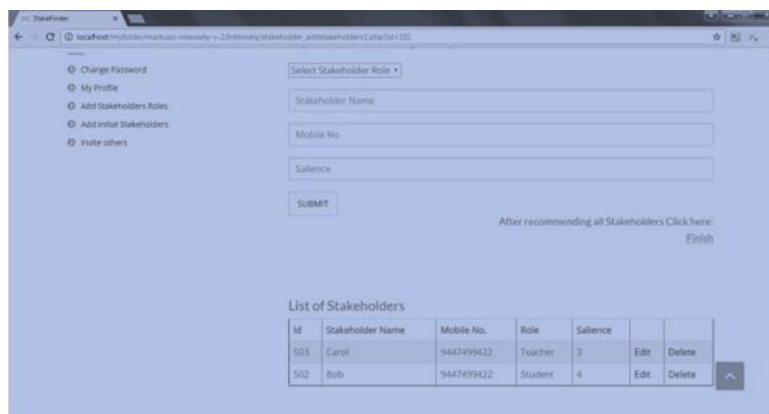
Step 8: The admin can track about all the new stakeholders added and whether they have completed they recommendation in 'View Progress' form



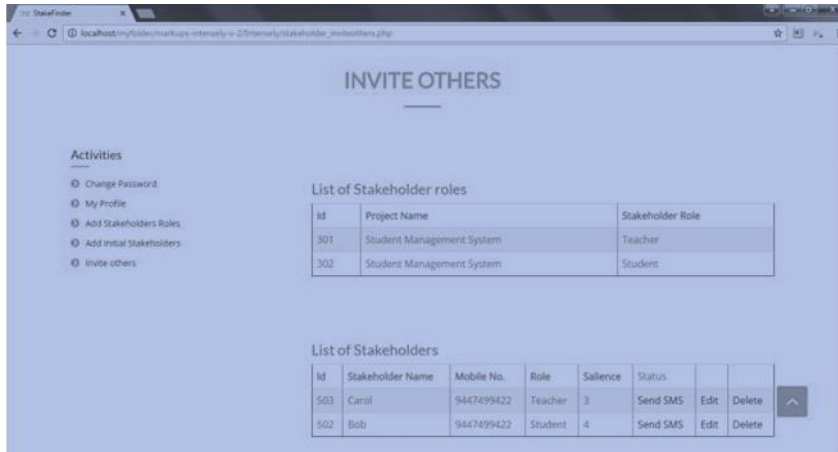
Step 9: Now login by clicking on the 'LOGIN/SIGN UP' button in the top

Stakeholder can sign up and on the 'LOGIN/SIGN UP' right corner of the site.

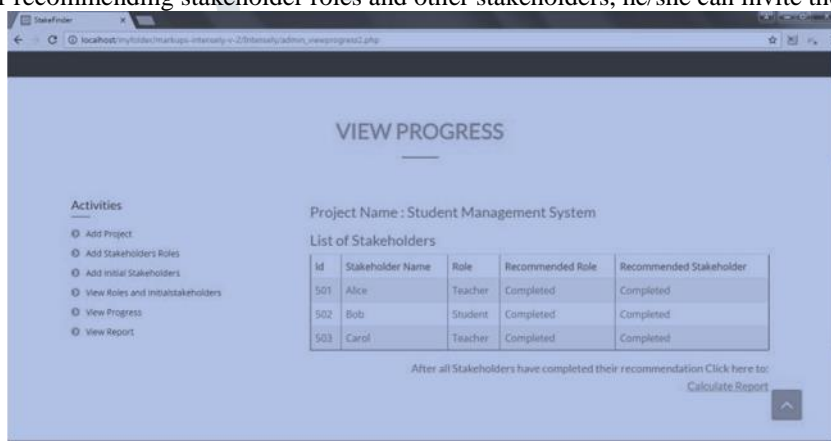
Step 10: The stakeholder can now recommend new stakeholders roles. And after finishing it click on the 'FINISH' button at the bottom of the form.



Step 11: Now he/she can recommend other stakeholders. And after finishing it click on the ‘FINISH’ button on the bottom.

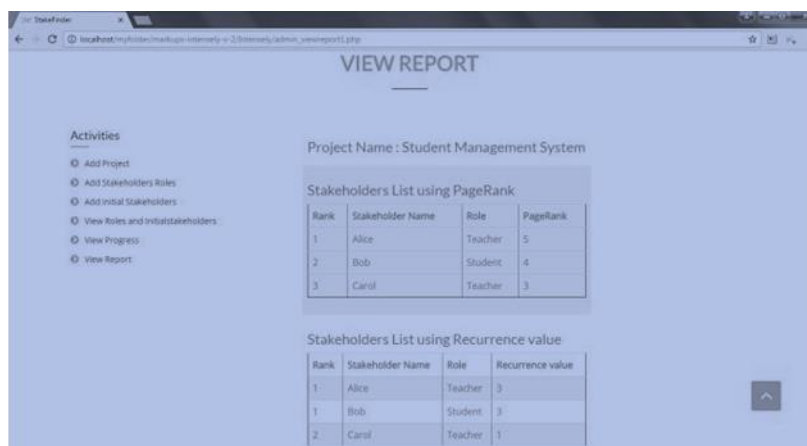


Step 12: After recommending stakeholder roles and other stakeholders, he/she can invite them by sending those messages.

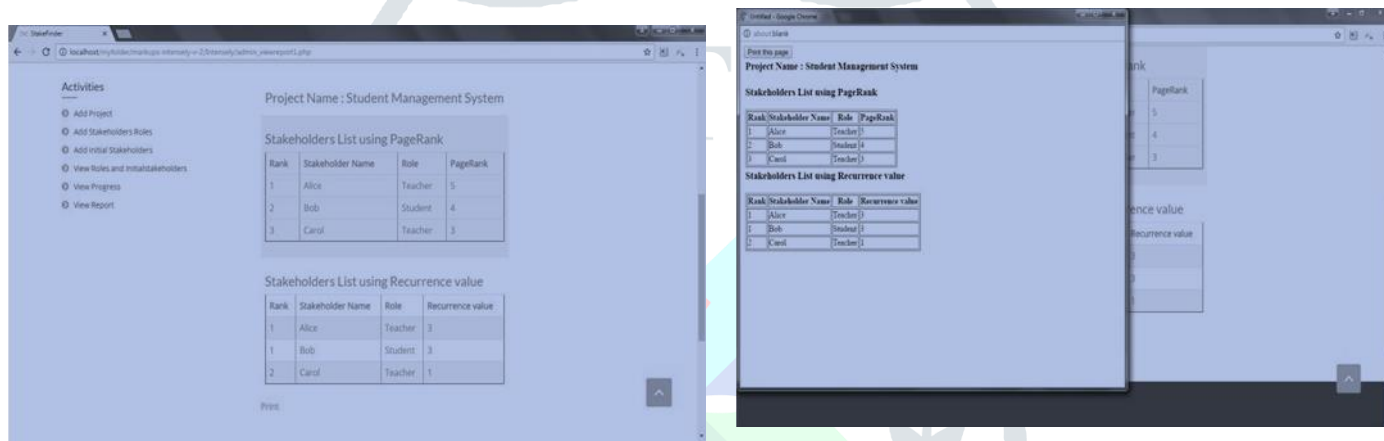


Step 13: The admin can keep track of the progress and once all recommended stakeholders complete recommendation, click on the ‘Calculate Report’ button on the bottom to calculate the report.

Step 14: To view the report select the project in the View Report form



Step 15: You can also get a printed copy of the report by clicking the 'Print' button at the bottom of the form. The stakeholders having same PageRank/Recurrence value has the same Rank. In the case of tie, all stakeholders in tie are given equal importance.



**IV. RESULT ANALYSIS**

When we compare PageRank and Recurrence Value, we can see that PageRank works based on Saliense value. Saliense value is a rating given to a person out of 5 or 10. This value can be biased. Also a person who doesn't know the influence of a person on the project can rate him wrongly. Thus salience value can go wrong and this affects the entire project. Whereas Recurrence value is purely based on the number of recommendation a person gets. Hence it is not biased. When we compare the two methods the recurrence value is more relevant and accurate measure as compared to PageRanking. Following is a comparison of the two methods with the prioritized stakeholders.

Table 3- Prioritized list of stakeholder using PageRank

The prioritized list of Stakeholder using PageRank,

Rank	Stakeholder	Role	PageRank
1	Alice	Teacher	5
2	Dave	Student	5
3	Carol	Teacher	4
4	Bob	Student	3

Table 4 – Prioritized List of Stakeholders Using Recurrence value

The prioritized list of Stakeholder using Recurrence value,

Rank	Stakeholder	Role	Recurrence Value
1	Alice	Teacher	3
2	Carol	Teacher	2
3	Bob	Student	1
4	Dave	Student	1

**V. CONCLUSION**

Stakefinder is an improved version of the Stakerare method which uses a new measure called recurrence value for identifying and prioritizing the stakeholders. When we compare PageRank and Recurrence Value, we can see that PageRank works based on Saliense value. Saliense value is a rating given to a person out of 5 or 10. This value can be biased. Also a person who doesn't

know the influence of a person on the project can rate him wrongly. Thus salience value can go wrong and this affects the entire project. Whereas Recurrence value is purely based on the number of recommendation a person gets. Hence it is not biased. When we compare the two methods the recurrence value is more relevant and accurate measure as compared to PageRanking. When a tie occurs between two stakeholders then both the page ranking and the recurrence method becomes difficult. As a future work this case also needs to be addressed.

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