

# Web based Tender Bid Analysis and Recommendation System using Collaborative Filtering

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**Abstract -** Now a days all government projects, infrastructure enhancement are provided to individuals through tender system. But in the exiting approach, there is no transparency and government officials intervention is there, because of this the right vendor might be missed to get the order as there is lack of transparency. To address this issue, a web based tender analysis and recommendation system is proposed system using collaborative filtering. Proposed method selects the best bid provided by the vendors for a respective tender. It also provides transparency and enhances opportunity for new vendors to participate in bid. For experimental results, we used java for this web based tender analysis and recommendation system. Promising results obtained by continuously refining the trained model utilizing new goals information, scope of type of tenders and anticipating whether any activity is specified. The proposed system saves time of processing, easy decision making, reduces tender costs for governments and motivates new players to participate and perform the bid.

**Keyword:** tender bid analysis, collaborative filtering, regression model, integrated neighbor model .

## 1. INTRODUCTION

The motivation of this project is to develop a web based tender bidding analysis of vendors making the governmental tender process transparent and gaining people confidentiality. Web based Tender bid analysis and recommendation system is developed for choosing right application by validating best bidding conditions. Best bid is identified by analyzing vendors applications using three models such as regression model, integrated neighbor model and item based collaborative model. Results shows item based collaborative model finds the best bid in short period compared to regression model and integrated neighbor model. Results shows the proposed system saves time of processing, easy decision making, reduces tender costs for governments and motivates new players to participate and perform the bid.

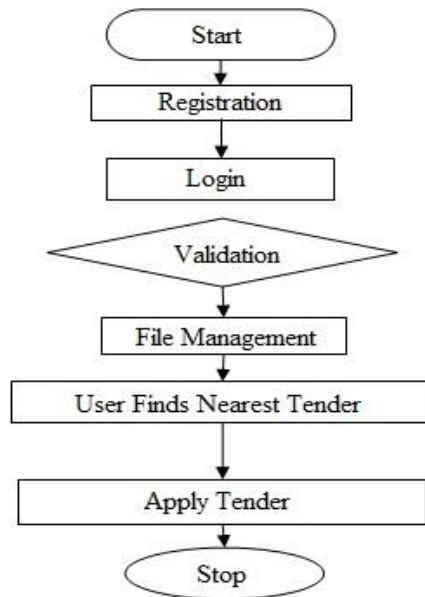
## 2. REVIEW OF LITERATURE

In the existing system, the tender analysis is done manually which invokes greater manpower efforts and time consuming. Also the existing tender analysis cannot provide promising results. A precise writing audit utilizing meta-investigation is needed to fill the application and validate the answers provided by the applicant. But the concern is different documents require different validations. High-precision cross-tender analysis tool determining models accomplish high exactness is extraordinary contrasted with high-precision cross-tender gauging models [2].

Purpose of this project is to render transparency in the governmental tender process. The system should be trained to make the decision like best bid among the received bids automatically. This system would reduce the manpower efforts and exhibit good performance. Also the system acquires all required parameters from the applicants during the tender process which recognizes mistakes, faults at the early stage.

### 3. METHODOLOGY

Figure 1 shows the various steps in the proposed methodology. System is trained with many factors to access the parameters filled by the applicants. Our methodology is unique concerning the recently proposed prescient models [3][4].



**Fig 1. Methodology**

Various steps in the methodology are summarized as follows.

#### **Registration**

In this module, administrators can see a list of all registered users. In this, the administrator can view user details such as username, e-mail, address and user authentication.

#### **Login**

The login block is a portal block that allows users to type in their Username and Password. This module can be placed in any volume tab to allow users to login to the system.

#### **User**

In this set, there are N numbers of users. The user must register before performing any activities. Once the user is registered, their details are stored in the database. Upon successful registration, user must log in using an authorized username and password. Upon successful login, he will perform some functions such as viewing the user profile, adding a category, and using a tender.

#### **Agreement**

The delicate normally alludes to which governments welcome offers for huge undertakings to be submitted inside a particular time period. Offering is the way toward communicating enthusiasm for an offer, offer or proposition or reacting to a delicate or call or solicitation. From the time the delicate is given, it will generally be in the market for 25 schedule days. Pre-release product, advertising period, ratings, tender board approval and contract closing are usually 90 says before the end of a tender process [5]. Tender is an accommodation put together by a temporary worker because of a delicate call. It gives the chance to convey merchandise or services. [6] Tender documents can be prepared to seek concessions, tender documents for equipment supply, major construction contract (including contractor design), demolition, execution of works.

### **Domestic Tender**

Round or induced tender within a nation is called a domestic tender. [7] Tender is an accommodation made by a forthcoming provider because of a call to the delicate. It is an admission to flexible merchandise or administrations. In development, the fundamental delicate procedure is normally to choose a contractual worker who will make the workforce.

### **International Tender**

Sensitive information an online government tender information provider that helps businesses worldwide finds business opportunities. Our tender portal provides information on E-procurement, general tenders, government auctions, and international auction opportunities. We help businesses from all sectors and countries with tender channels to help grow their business globally through tendering.[8] An international tender is a competitive selection process undertaken by A public body to contract a service, hire a job, or obtain goods. Widespread tenders are open to any company because the important thing is not the size, but the economic situation

### **Competitors**

Any individual or association is a contender against another. In business, an organization in a similar industry or comparable industry that gives a comparable item or administration [9] [10]. The nearness of at least one contender may diminish the cost of products and ventures as organizations looking to increase a bigger piece of the overall industry. Any individual or organization in a similar industry or comparable calling, o it competitor that provides a product similar to another person or company, is called, these two tests enable a competitor to analyze Its attractiveness [11][12][13].

### **Validation**

Validation of tender is done using three models such as regression based model, integrated neighbor model and item based collaborative model.

#### **i. Regression Model**

Regression model is a classification algorithm used to predict a binary outcome (1 / 0, Yes / No, True / False). Logistic regression is a special case of linear regression model which predicts the probability of occurrence of an event by fitting data to a logit function. Fundamental equation of logistic regression model is given as follows:

$$g(E(y)) = \alpha + \beta x_1 + \gamma x_2 \quad (1)$$

Where,  $g()$  is the link function,  $E(y)$  is the expectation of target variable and  $\alpha + \beta x_1 + \gamma x_2$  is the linear predictor (  $\alpha, \beta, \gamma$  to be predicted). The role of link function is to 'link' the expectation of  $y$  to linear predictor.

#### **ii. Integrated neighbor model**

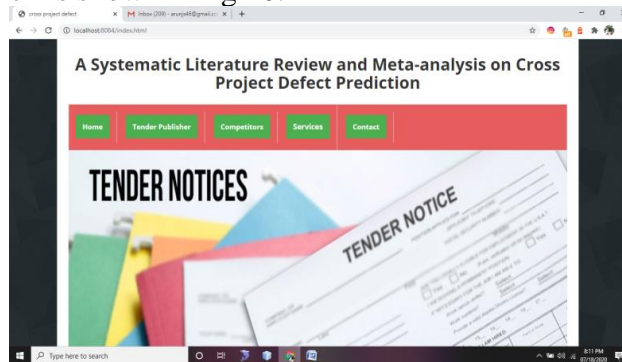
Integrated neighbor is a non-parametric and lazy learning algorithm. Non-parametric means the model structure is determined from the dataset. Lazy algorithm means it does not need any training data points for model generation. All training data used in the testing phase. This makes training faster and testing phase slower. It needs more time to scan all data points and scanning all data points will require more memory for storing training data. Data points are transformed into feature vectors, or their mathematical value. The algorithm then finds the distance between the mathematical values of these points .It runs Euclidean distance formula to compute the distance between each data point and the test data. It then finds the probability of these points being similar to the test data and classifies it based on which points share the highest probabilities.

iii. Item based Collaborative model

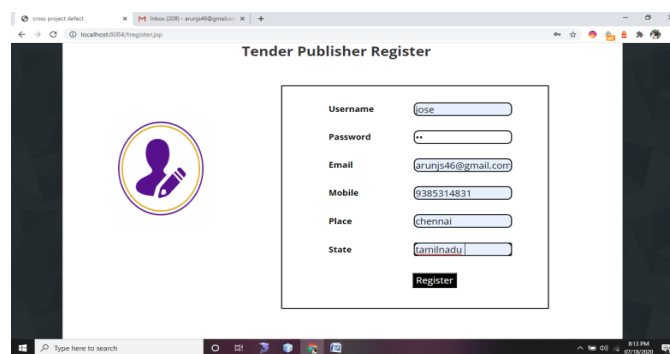
It is a tree where each non-terminal node represents a test or decision on the considered data item. Choice of a certain branch depends upon the outcome of the test. To classify a particular data item, start at the root node and follow the assertions down until we reach a terminal node (or leaf). A decision is made when a terminal node is approached. Decision trees can also be interpreted as a special form of a rule set, characterized by their hierarchical organization of rules.

**4. EXPERIMENTS AND RESULTS**

In the experimental results we have used net beans tool for application creation and java as the scripting language. Fig 2. defines the home page or landing page through which the applicant can register and upload the tender. Fig 3. explains the application registration form, in which the applicant provides the essential details. Fig 4. explains the tender upload page through which the applicant can apply for the tender providing all the required information's and quote. Once the applicant fills the form, they can choose the respective tender and apply for it which is shown in fig 5. The admin or government officials can login and view the submitted tender applicant details which is shown in fig 6 & 7. The admin can ask for reconsideration of quote to the applicant and the respective applicant would receive the email notification which is shown in fig 8. After receiving this e-mail, the applicant can re-apply for the tender with the revised quote and missed information which is shown in fig 9 and submission confirmation would be sent to the application which is shown in fig 10.



**Fig 2. Home page**



**Fig 3. Tender Publisher Registration**

The screenshot shows a web browser window with the URL localhost:8084/publisher\_home.jsp. The page contains a form for uploading tender details. The form fields are as follows:

|               |                     |
|---------------|---------------------|
| Tender        | construction tender |
| Materials     | raw materials       |
| Design        | cadd                |
| Dimension     | 1000                |
| Prototype     | bridge              |
| Standard      | ISO9000             |
| Amount        | 100000              |
| Duration      | 75                  |
| No Of Labours | 20                  |
| Location      | chennai             |
| State         | tamilnadu           |
| Closing Date  | 20-07-2020          |

An 'Upload' button is located at the bottom right of the form.

**Fig 4. Tender Upload Page**

The screenshot shows a web browser window with the URL localhost:8084/competitor\_home.jsp. The page displays 'View Tender Details' with a table containing one row of tender information and an 'Apply Tender' link.

| Tender             | Sector          | Tender Name         | Location | Closing Date | Action                       |
|--------------------|-----------------|---------------------|----------|--------------|------------------------------|
| tender_by_industry | domestic_tender | construction tender | chennai  | 20-07-2020   | <a href="#">Apply Tender</a> |

Below the table, there is a red banner with the text: 'A Systematic Literature Review and Meta-analysis on Cross Project Defect Prediction'.

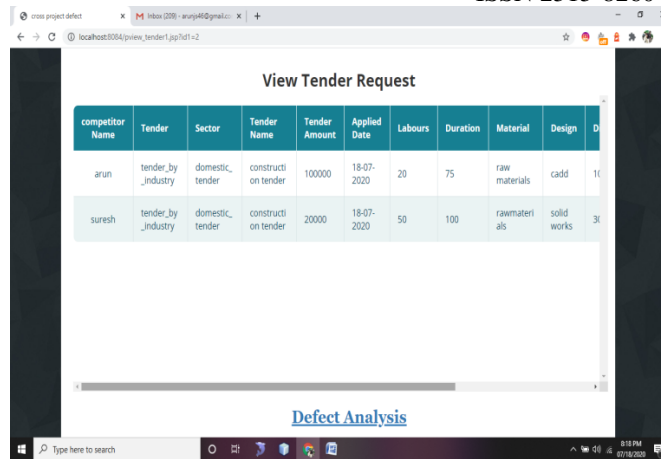
**Fig 5. Apply Tender page**

The screenshot shows a web browser window with the URL localhost:8084/preview\_tender.jsp. The page displays 'View Tender Details' with a table containing one row of tender information and a 'View Tender Request' link.

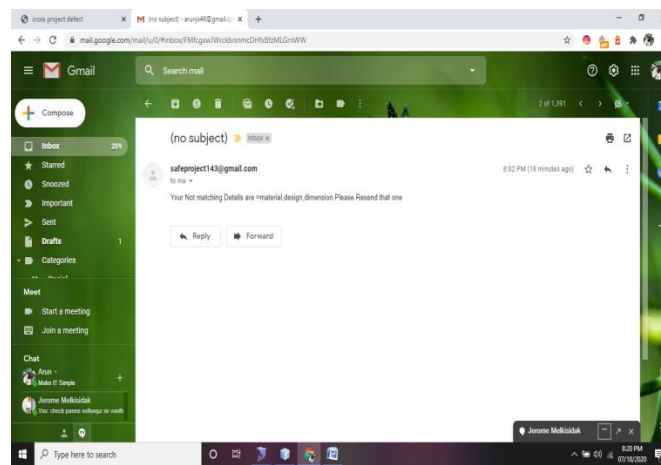
| Tender             | Sector          | Tender Name         | Amount | Location | Closing Date | Action                              |
|--------------------|-----------------|---------------------|--------|----------|--------------|-------------------------------------|
| tender_by_industry | domestic_tender | construction tender | 100000 | chennai  | 20-07-2020   | <a href="#">View Tender Request</a> |

Below the table, there is a red banner with the text: 'A Systematic Literature Review and Meta-analysis on Cross Project Defect Prediction'.

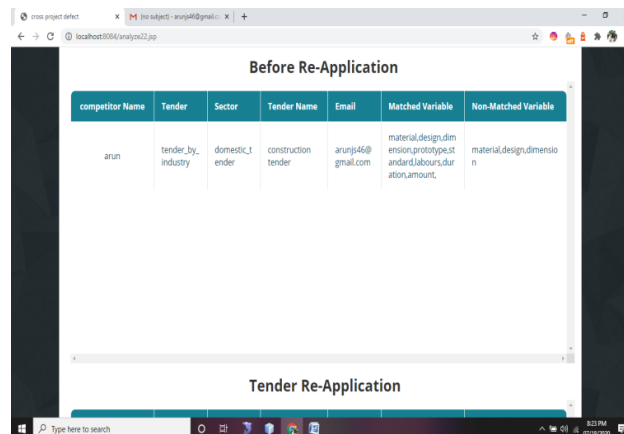
**Fig 6. Tender Publisher Analysis**



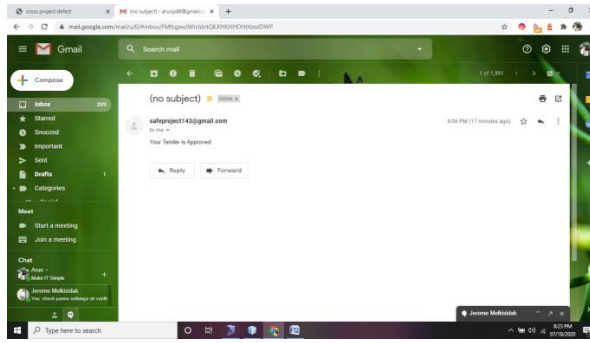
**Fig 7. View Tender Details**



**Fig 8. Tender Analysis result**



**Fig 9. Tender Re-Application**



**Fig 10. Tender Confirmation Mail**

The performance of the proposed system is tested by creating a web application with cross tender analysis module using netbeans. The proposed item based collaborative filtering model performance is compared with regression based model and integrated neighbour based model with analyzing the execution time of the developed code. The results in netbeans console show item based collaborative filtering model takes lesser execution time when compared with other algorithms. This is shown in table 1. Figure 11 based on the results in table 1

**Table 1. Performance comparison**

| Performance                              | Execution Time m/s |
|--|--------------------|
| Regression-based model                   | 3.5                |
| Integrated neighbor-based model          | 3.1                |
| Item based collaborative filtering model | 2.6                |



**Fig11. Comparison graph**

#### 4. CONCLUSION

In this paper, web based tender bid analysis and recommendation system is proposed using Web Collaborative Filtering. This has a huge scope in both government and private sectors to provide transparency and motivate new players to participate in the tender process. This system makes the applicant to provide all important parameters while submitting the bid document so that validation process would be efficient. Also the proposed system using item based collaborative filtering model matches and validates the parameters among cross-tender using the conditions. Compared to regression based model, and integrated neighbor model, the item based collaborative model validates the best bid conditions and right applicant are chosen within a short periods time saving much of manpower efforts

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