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A Novel Approach for Resolution Recommendation for Generated Tickets

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ABSTRACT: In our work, we develop techniques to recommend appropriate resolution for incoming events by use of similarities between the events and historical resolutions of these similar events. Built on the traditional K Nearest Neighbor algorithm, our proposed algorithms check false positives which are generated by monitoring systems. As the effectiveness of the K Nearest Neighbor (KNN) algorithm heavily depends upon the similarity measurement, in this we proposed two other approaches to improve our recommendation with respect to better resolution. First approach uses topic-level features to incorporate resolution information into the similarity measurement and second uses metric learning to learn a more effective similarity measure.

KEYWORDS: IT Service Management, Recommender System, K nearest neighbor, Latent Dirichlet Allocation, Metric Learning.

I. INTRODUCTION

Now days, High Quality customer service is more important for companies. It is also reported that 70% of the customers hit the road not because of the price of product or quality of product issues but because they do not like the customer service provided. Current customer service such as helpdesk, call center involves a lot of manual operations, which require customer service representatives to handle a large variety of
Different issues. It is difficult to transfer knowledge and experience between representatives. Many companies try to build intelligent helpdesk systems to improve the quality of customer service. With the large development of online shopping , a vast amount of research has been done to recommendation systems. Such recommendation systems determine items and similar products to be recommended based on user priority and similar users. Substantial increase in number of user interactions are providing this applications with a huge volume of historical information . In this paper, we develop a same approach and develop a method that finds a resolution for an event by use of similarities between the events and historical resolutions of monitoring tickets. Most service providers store historical tickets with their similar resolutions. Each event is stored in a database record that consists of several related attributes.

II. LITERATURE REVIEW

1. **Managing Faults in the Service Delivery Process of Service Provider Coalitions** - *P. Marcu, L. Shwartz, G. Grabarnik, and D. Loewenstern.* It is an Information model which validates and supports inter organizational incident management and describes probabilistic model of fault discovery.
2. **IT service management automation - A hybrid methodology to integrate and orchestrate collaborative human centric and automation centric workflow** - *N. Ayachitula, M. J. Buco, Y. Diao, M. Surendra, R. Pavuluri, L. Shwartz, and C. Ward.* Complexity model to assist in identifying automation opportunities to satisfy the need for continuous efficiency and cost improvement
3. **Recommending resolutions for problems identified by monitoring** - *L. Tang, T. Li, L. Shwartz, and G. Grabarnik.* Algorithms achieve a high accuracy with a small percentage of misleading results.

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4. **Discovering actionable patterns in event data** - *J. L. Hellerstein, S. Ma, and C.-S. Perng.* Efficient algorithms to mine three types of important patterns from historical event data: event bursts, periodic patterns, and mutually dependent patterns
5. **Item-based top-n recommendation algorithms** - *M. Deshpande and G. Karypis.* Item-based top-n recommendation algorithms.

III. EXISTING SYSTEM

In automated service management, the resolutions of false tickets reveal unhelpful comments, such as, "this is a false alarm," "everything is fine" and "no problem found." If a false ticket's resolution is recommended for a real ticket, the system administrator might overlook the real system problem. Note that in a large enterprise IT environment, overlooking a real system problem may have serious consequences, such as system crashes. However, the traditional KNN-based algorithm has no mechanism to avoid such a case in the ticket resolution recommendation task. A traditional KNN-based (K Nearest Neighbor) approach using attribute-level features has been first applied to provide resolution recommendations for incoming tickets in service management. However, the traditional KNN-based algorithm has one big drawback when applied to system management.

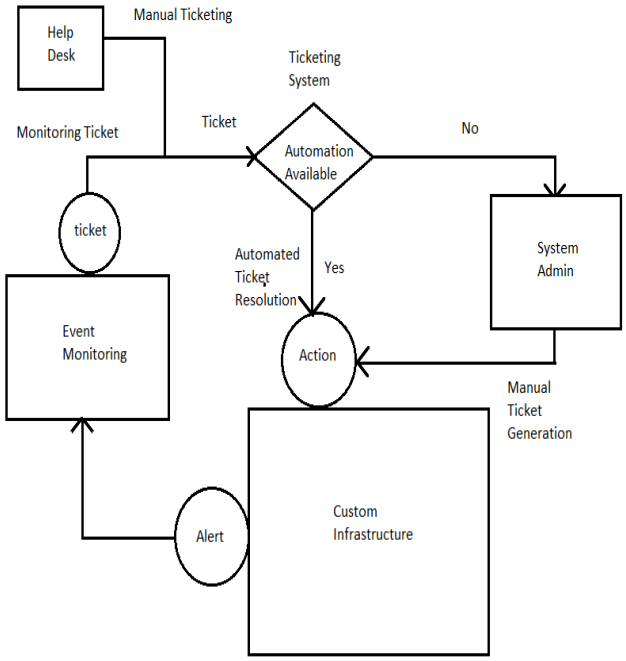

Figure 1: Management System

IV. PROBLEM STATEMENT

Given an incoming ticket, the objective of the resolution recommendation is to find k resolutions as close as possible to the true one for some user-specified parameter k from the historical tickets. Each Historical Ticket has two components first one is Event Ticket and second one is Ticket Resolution. Each of this Two Component has different attributes.

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V. SYSTEM OVERVIEW

In our work, we develop techniques to recommend appropriate resolution for incoming events by making use of similarities between the events and historical resolutions of similar events. Built on the traditional K Nearest Neighbor algorithm .Here customer enters the query according to query ticket will generate and after processing customer will get resolution for that query. we proposed two other approaches to significantly improve our recommendation with respect to resolution relevance. One approach uses topic-level features to incorporate resolution information into the similarity measurement; and the other uses metric learning to learn a more effective similarity measure. We first apply traditional KNN algorithm for event ticket resolution recommendation and extend it to two other resolution recommendation algorithms capable of eliminating misleading resolutions. Prepare Your Paper before Styling

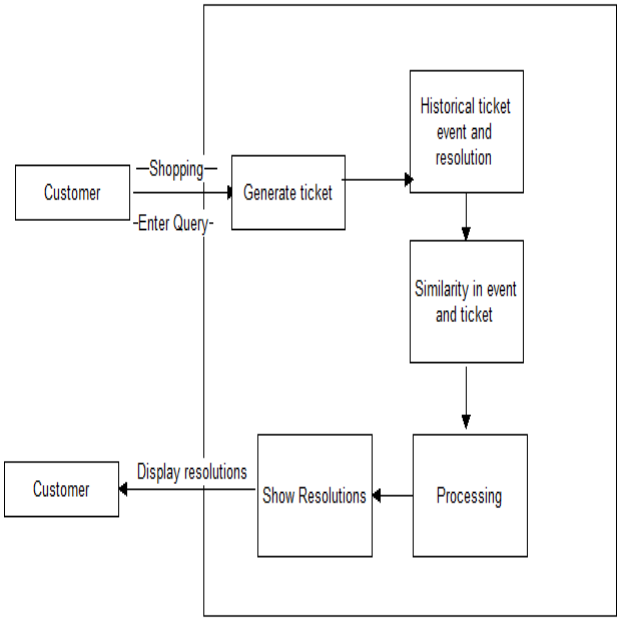

Figure 2: System Architecture

VI. PROPOSED ALGORITHMS

Six different algorithms are included in the figure and are organized into two groups based on their purpose:
1. Weighted KNN algorithm: Basic weighted KNN algorithm uses attribute-level features.
2. Division: It use two-step approach for recommendation classify an incoming Event into a true or false ticket, then recommending Resolutions based on its class.
3. Fusion: The algorithm uses an additional penalty to minimize misleading resolutions.
4. LDABaselineKNN: It uses topic-level features obtained through Latent Dirichlet Allocation.
5. CombinedLDAKNN: The algorithm uses both the event and resolution information with top level features.
6. MLCombinedLDAKNN: The algorithm uses the similarity measure obtained from metric learning.

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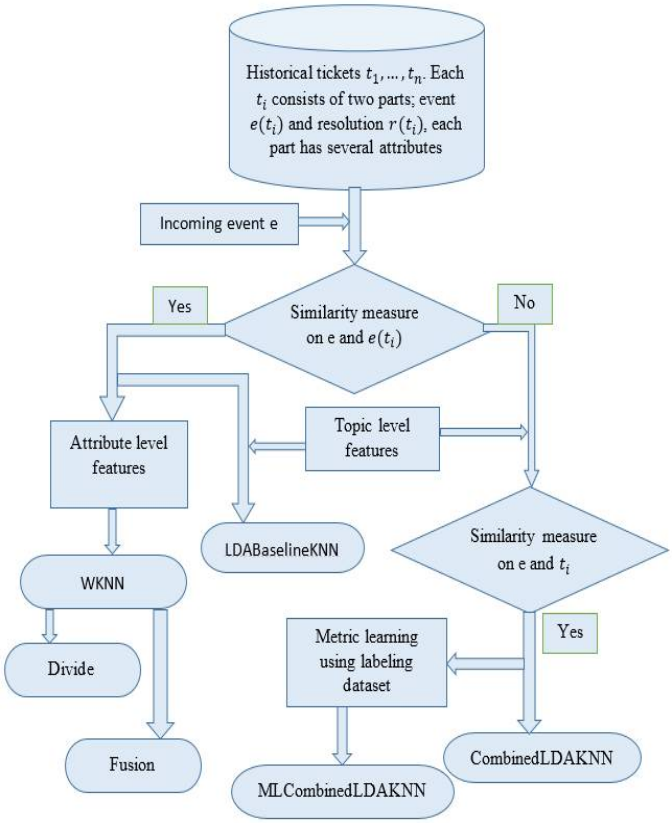

Figure 3: Different Algorithms

Basic KNN-based Recommendation

In pattern finding, the K-nearest neighbour algorithm (KNN) is a non parametric method used for classification and regression. The input consists of the K closest training examples in the feature space. The output is depending upon whether KNN is used for classification or regression.
In KNN, An object is classified by a majority vote of its neighbours, with the object assigned to the class most common in its K nearest neighbours. In KNN regression, the output is the property value for the object. This value is the average of the values of its *k* nearest neighbours.

VII. DIVISION METHOD

In this method all historical tickets classified into two sets: the real tickets and the false tickets. Ticket type predictor is created, establishing whether an incoming ticket is real or false, with the appropriate recommender. The division method works as follows: it first uses a type predictor to predict whether the incoming ticket is real or false. If it is real, then it recommends the tickets from the real historic tickets; if it is false, it recommends the tickets from the false historic tickets.it is already proposed by administrator, so their types are known and we do not have to predict them. It is simple, but relies heavily on the precision of the ticket type predictor, which cannot be perfect. If the ticket type prediction is correct, there will be no penalty for any recommendation result. If the ticket type prediction is wrong, every recommended resolution will incur a penalty.

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VIII. FUSION METHOD

To reduce the limitation of the division method, we propose a fusion method. The framework of the basic KNN-based recommendation is implemented, with the difference that the penalty and probability distribution of the ticket type are incorporated in the similarity function..

IX. EXTENSION TO IMPROVE ACCURACY

The attribute level features are used in the traditional KNN algorithm for recommendation. Attribute-level feature is not interpretable as well contains a lot of noise. Each monitoring ticket explains the existing problems such as low capacity, high utilization and high CPU use. The ticket resolution is highly relevant to the problems.
In this we apply Latent Dirichlet Allocation (LDA) to perform extraction, which will extract hidden topics and then encode monitoring tickets using topic level features
With LDA, the documents have written in following ways:
1) First decide on the number of words in the document;
2) Choose a topic mixture for the document
3) Generate each word by picking a topic and use topic to generate the word.

X. CONCLUSION

Proposed system will solve the issues of resolution recommendation for monitoring tickets in an automated service management. Based on our prior work of KNN-based recommendation, we develop the similarity measure by utilizing both the event and resolution information from historical tickets via a topic-level feature extraction using the LDA (Latent Dirichlet Allocation) model. In addition, a more effective similarity measure is learned using metric learning when resolution categories are available.

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