

Validation of Warranty Defect Codes

To ensure

VEHICLE QUALITY WITHIN WARRANTY.

Using Machine Learning-NLP.

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Abstract : Vehicle maintenance is getting increasingly important as the transport solutions become more complex and the transport industry seeks new ways of being competitive. Generally, Service Engineer receives customers claim for repair or replacement or compensation for nonperformance in the warranty period. When the customer claims his warranty, the claim contains customer voice, dealership investigation and claim manager's action pertaining to particular "Defect Code". Analyzing the correct defect code based on the description provided by customer requires a lot of efforts. So, our goal is to design an automated system using Natural Language Processing and Machine Learning which will decode the description and will find the most appropriate Defect Code. For this, techniques used are TF-IDF (Term Frequency-Inverse Document Frequency), Point Wise Pointwise Ranking (LSTM algorithm). Completion of this project will make sure that incorrect faults are not addressed during warranty claim analysis.

KeyWords – Defect Code, NLP, TF-IDF, Pointwise Ranking.

I.INTRODUCTION

Natural Language Processing (NLP) is the interaction of Computer Science, and Machine Learning that is concerned with the communication between computers and humans in natural language. NLP is all about enabling computers to understand and generate human language. Applications of NLP techniques are Machine Translation and text-filtering. NLP is one of the fields that heavily benefited from the recent advances in Machine Learning, especially from Deep Learning techniques. The field is divided into the three following parts:

- 1) Natural Language Understanding-The computer's ability to understand what we say.
- 2) Natural Language Generation-The generation of natural language by a computer.

The significance of "Defect Code" is that the entire failure analysis and rectification process at design/manufacturing/supplier end, happens on the vehicle parts or aggregates that the defect code is related to.

Using the detect fault and diagnosis (DFF), the problems can be shortlisted. Vehicle manufacturers will discover issues through description provided by the dealers of vehicles. As the description is written by local non-technical knowledge-based workers, so it will be processed and required data will be gathered from it. There are a lot of technical complaints regarding vehicle which are commonly described from which the exact complaint should be extracted which will give the correct solution to the problem.

Using analysis techniques in NLP like phrase extraction etc. helps analysts in the task of extracting relevant task to some extent. But the drawback of using these tools they do not perform well on noisy text data which contains incorrect grammar and spellings.

Pure dictionary-based analysis mechanisms are also not completely reliable for analyzing noisy text data due to spelling errors and non-standard vocabulary.

II.SYSTEM ARCHITECTURE

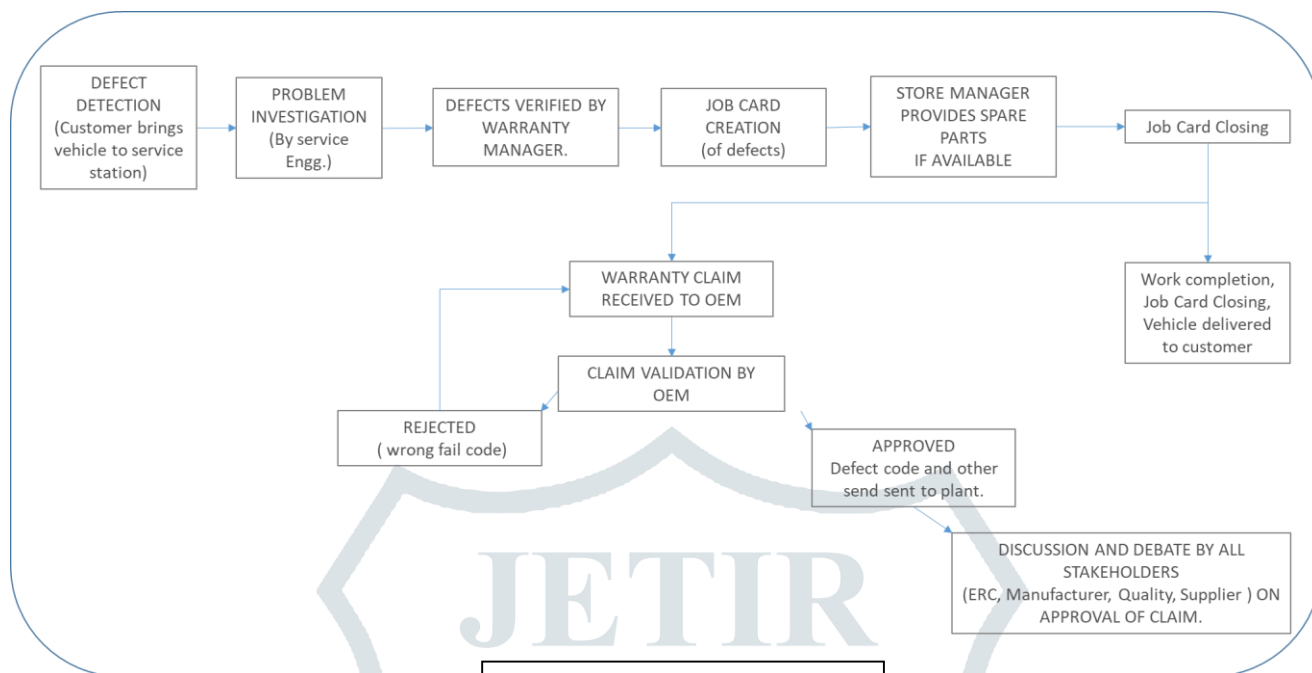


Fig.: Current Scenario

Above Flow Diagram shows the current scenario has flow of working. Initially, when the customer meets some problem in vehicle, he brings the vehicle to service center and the problem in the vehicle is detected and the further verification of defects detected is done by service engineer and warranty manager. Then the Job card creation and warranty claim acceptance or rejection is done by the OEM. Further, the discussion and debate is conducted on these issues for further actions and resolutions.

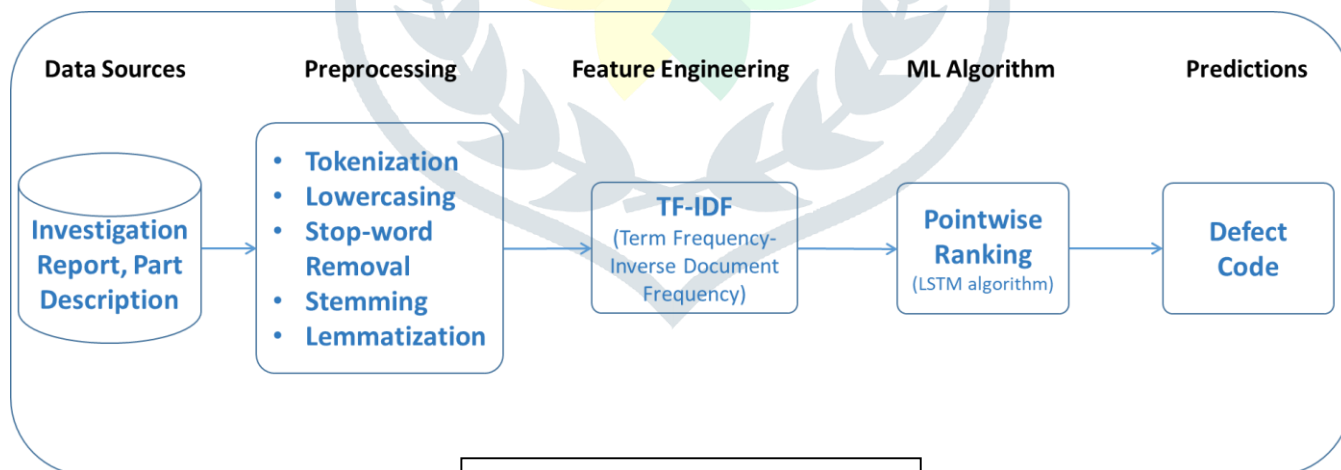


Fig.: Proposed System Architecture

Above Proposed System architecture show how the system is to be designed and how its working flow will be. Also, how the data will be investigated at initial steps and will undergo the preprocessing techniques viz.: Tokenization, Lowercasing, Stop-word, Removal, Stemming Lemmatization. Feature Engineering step will work on TF-IDF (Term Frequency Inverse Document Frequency) and further ML algorithm like Pointwise Ranking and LSTM will result the most relevant defect code.

III. Literature Survey

The paper “vehicle detection and defect discovery from social media” by Alan S. Abrahams is based on extracting the relevant data from the social media feedback and comments. This paper had compiled an alternative set of automotive smoke words that have higher relative prevalence in defect detection. But on the other side this system was designed only for non-technical description provided by comments in social media. Another paper “An Integrated Text Analytic Framework for Product Defect Discovery”, which resulted in Proposed a smart integrated analytic framework that links the quantitative text features to underlining existence of a product defect. In this paper, we come across a flaw of opinion purposely made positive by posting positive comments deliberately. Other referred paper was “Automated FAQ Answering with Question-Specific Knowledge Representation for Web Self-Service” which gave an idea how the system is efficiently working on the large set of synonyms of words and their ontological orders also. But an observation shows that most of the question are repeated and for answering these questions the previously saved database is used, but if the answer is not available is then system unable to answer the question.

IV. CONCLUSION AND FUTURE WORK

The Validation of warranty defects codes to ensure validation within warranty period will be providing the best user experience for its users in order to provide quick results, avoid wastage of time on manually validating the warranty claim by the customer. For this, we will be using the most optimal machine learning algorithm and natural language processing techniques. For this, we will be using the most optimal machine learning algorithm and natural language processing techniques. This system will be currently developed only for vehicle defect detection from the description provided by the customer. Thus, we can increase the efficiency in the process of vehicle maintenance. And we can also benefit the automobile industry with the wonders of Machine Learning. This system will be currently developed only for vehicle defect detection from the description provided by the customer. Later, on appropriate generation of algorithm this system will be used as a general-purpose text analyzer which will help in automated FAQ answering, retrieving the exact information of products or sentimental analysis of feedback. Future work is needed to study how this technique will play out in other industries. To develop sub-modules to the current system so that the defect code generated automatically gets associated with the warranty claim without manual addition of it.

Advantages

- This automated system selects the most suitable defect code and suggest it to the service engineer
- As the system is pre-trained with previous examples, the probability of errors is minimized.
- The number of people working at backend can be reduced.
- The manufacturer is also benefited as he won't be a victim to the false defect codes.
- This system is easy to use for the blind because natural language processing features have been incorporated.
- Relatively Low cost and high performance.

Disadvantages

- The system will only work if the description of the problem contains some technical keywords which the system is previously aware of.
- The system presently generates the most relevant two to three defect codes which can be made better.

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