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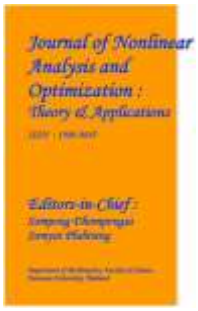

ONLINE FINANCIAL COMPLAINT AND SEVERITY DETECTION USING MULTI TASK FRAMEWORK

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ABSTRACT— The automatic detection of financial complaints can benefit businesses and online merchants. Compared to manually tagged complaints, they can use this information to monitor and address issues and effectively route them to appropriate teams. This can also promote greater transparency and accountability when dealing with consumer financial products and services, strengthening the firm's brand value. In linguistic studies, complaints have been classified into severity categories based on the level of risk the complainant is prepared to accept. Furthermore, since emotions influence every speech act, an individual's emotional state considerably impacts the complaint expression. In this project, we introduce a Financial Complaints resource, a collection of annotated complaints arising between financial institutions and consumers expressed in English on Twitter. The dataset has been enriched with the associated emotion, sentiment, and complaint severity classes. For a comprehensive evaluation of our dataset, we develop a multi-task framework for complaint detection and severity classification with emotion recognition and sentiment classification as the additional tasks and compare it with several existing baselines.

Index Terms— Complaint Corpus, Complaint Detection, Complaint Severity Detection, Deep learning, Finance Complaints, Multi-task learning.

I. INTRODUCTION

ARTIFICIAL INTELLIGENCE (AI) is transforming how people and organizations access and manage their finances. While the shift from traditional financial services to digital finance was already underway pre

pandemic, the pandemic accelerated the process as stay at- home requests became the new normal for financial institutions, and customers decided to seek more self-service options. AI and machine learning in finance cover everything from fraud detection to chat bot assistants and task automation. Other than these mainstream applications, addressing digital service complaints could be a significant commercial application for AI in finance. Compared to manually tagged complaints, automated detection of financial complaints pertaining to fraudulent transactions, delayed fund transfers, lousy customer service, etc., could help direct them to appropriate teams. This can further help promote fairness and transparency while dealing with loans, credit cards, and other consumer financial products and services, thus improving customer experience and increasing the organization's brand value.

In linguistics, complaining is defined as an individual's statement of dissatisfaction with an enterprise, commodity, or event. Complaints have been grouped into various degrees of severity based on the emotional intensity of the complaint, the amount of face-threat that the complainer is willing to undertake, and the complaint's motive. The objective of complaining could be to voice dissatisfaction, seek explanations, or both. Identifying complaints and associated severity levels in natural language is crucial for downstream application developers such as customer service chat bots and commercial organizations to improve their customer support capabilities by identifying and resolving complaints.

Various social media and micro blogging services, such as Twitter2, Facebook3, and Tumblr4, have skyrocketed in popularity in recent years. The reason being all these forums enable effective communication amongst Web users worldwide. These social media sites, which offer millions of messages and information to be exchanged daily, are multifaceted and invaluable resources for investigating and understanding people's perceptions and evaluating the data generated by participants. Among various social media platforms, Twitter is among the most widely used social media services, with engaging individuals, famous events, and intriguing issues. The social aspect of Twitter, combined with its huge volume, has transformed it into a cost-effective data repository for exploring and evaluating activities, conduct, and user opinions. As a result, the crux of this study is analyzing Twitter-based complaints essentially focused on the Financial domain.

The intended content of every speech act is strongly influenced by a user's emotional condition. Emotion detection is far more sophisticated and fine-grained in terms of research than sentiment classification. Emotion provides a deeper understanding of the customer's mind when combined with sentiment. A statement, for example, could entail only a negative sentiment, whereas emotion could be anger or even disgust. The relationship between emotion and sentiment urges us to examine the sentiment and emotion of customers while studying complaints..

II. LITERATURE SURVEY

A) Complaints in Linguistic Studies

Previous work in linguistics has categorized complaints based on their severity and directness. Complaints can be divided into four fine-grained severity classifications, according to Trosberg [2]: (a) no explicit reproach; (b) disapproval; (c) accusation; and (d) blame. Quite recently, [3] divided complaints into three categories: very direct, moderately direct, and indirect. Clear violations of expectations are referred to as direct complaints (i.e., very direct and moderately direct). On the other hand, indirect complaints do not directly specify or imply a breach of expectations. Furthermore, the contrast between very direct and moderately direct is that the former underlines the obligation of the complaint recipient, while the latter does not.

B) Multi-task Learning

Previous findings have confirmed the efficiency of multi-task systems by simultaneously learning multiple associated tasks. An individual's emotional state and sentiment have a decisive impact on the intended content. Along with sentiment, emotion offers a deeper understanding of the consumer's mindset. The correlation between emotion and sentiment motivates us to consider complainants' sentiment and emotion while analyzing complaints. Moreover, sentiment and emotion play significant roles in human interactions and thereby contribute toward building efficient and versatile artificial intelligence-based systems.

C) Complaint Identification

Complaint identification on social media is a timeconsuming and challenging process that needs identifying complaints from disparate and noisy text samples with character constraints, the use of unpredictable abbreviations, and sarcastic expressions. Text-based complaints have earlier been investigated via semi-supervised strategies,

complex feature engineering-based machine learning methods, and deep learning models. In the work, authors proposed a logistic regression model with hand-crafted features for detecting complaints.

The authors of the work used an ensemble of neural language models enhanced by the usage of transformer networks on a Twitter-based Complaint dataset. In linguistics, complaints were earlier classified based on responsible branch, the level of urgency and the possibility of receiving a response.

D) Complaint Datasets

The Complaints dataset5 was published in the work [12]. The authors selected 93 customer service handles from Twitter and sampled original tweets addressed to these accounts. Only tweets that received a response from the customer support accounts were considered. A total of 1971 tweets were collected using this method. Additionally, 1478 tweets were sampled to guarantee a diverse and representative range of tweets. Overall, the dataset consists of 2214 non-complaints and 1235 complaints in English. The dataset was grouped into nine domains (i.e., Apparel, Cars, Electronics, Food, Retail, Service, Software, Transport, and Other). Recently in the work [15], authors extended the Complaints dataset with the complaint severity classes and analyzed the effect of severity levels on CI. The Product Review corpus6 [13] is a Hindi languagebased product review corpus. This corpus is a collection of product reviews posted on the retail website Amazon7 and the video-sharing platform, YouTube8 comment section. The corpus comprises 3711 instances, with 3145 being noncomplaints and 566 being complaints. The dataset was further grouped into five domains (i.e., Book, Headphones, Phone, Watch, and Miscellaneous)...

III. PROPOSED SYSTEM

The overview of our proposed system is shown in the below figure.

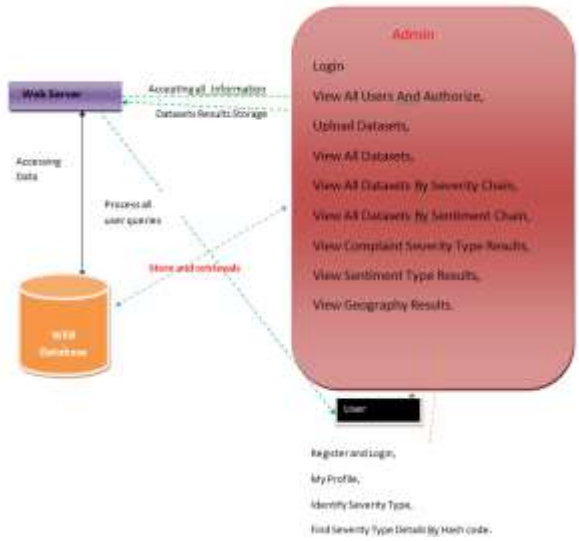

Fig. 1: System Overview

Implementation Modules

Admin

- In this module, the Service Provider has to login by using valid user name and password. After login successful he can do some operations such as Login View All Users And Authorize, Upload Datasets, View All Datasets, View All Datasets By Severity Chain, View All Datasets By Sentiment Chain, View Complaint Severity Type Results, View Sentiment Type Results, View Geography Results.

View and Authorize Users

- In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

User

- In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful user will do some operations like Register and Login, My Profile, Identify Severity Type, Find Severity Type Details By Hash code.

IV. RESULTS

Fig. 2: Home Page

Fig.3: Upload Datasets

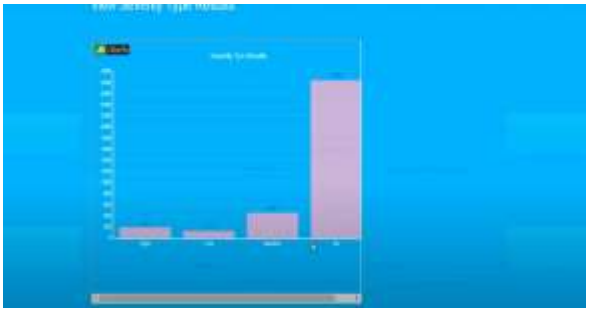

Fig.4: Severity type results

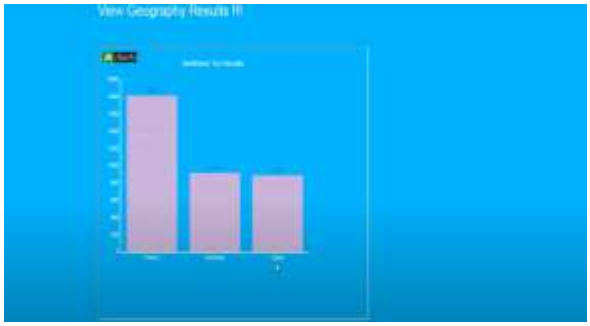

Fig.5: Severity type results

Fig.6: Severity type results

V. CONCLUSION

In this work, we have introduced FINCORP, an annotated dataset of complaints originating between financial institutions and consumers on Twitter. We have addressed the task of complaint identification and severity level prediction (primary tasks) jointly using a multi-task framework assisted by emotion and sentiment detection as auxiliary tasks. The project goes into a detailed description of the dataset and the complete process of creating it. Every instance in the FINCORP dataset has been annotated across four axes: complaint, severity level, emotion, and sentiment classes, resulting in a dataset with a lot of diversity. We evaluated the dataset and reported the findings using several single-task, multi-task and other existing baselines. Given the scarcity of task-specific (complaint identification) data in English and even some low-resource languages, we believe this dataset would add value to social media analytics research and practice.

REFERENCE

[1] E. Olshtain and L. Weinbach, “Complaints: A study of speech act behavior among native and nonnative speakers of hebrew. the prag-matic perspective,” 1985.

[2] Mohammed Ali Shaik, N.Sai Anu Deep, G.Srinath Reddy, B.Srujana Reddy, M.Spandana,B.Reethika, “Graph Based Ticket Classification and Clustering Query Recommendations through Machine Learning”, Library Progress International, Vol.44 No.3, July-December 2024, Pp.25828-25837

[3] L. N. Kakolaki and M. Shahrokhi, “Gender differences in complaint strategies among iranian upper intermediate efl students,” *Studies in English Language Teaching4 (1)*, pp. 1–15, 2016.

[4] Mohammed Ali Shaik, Praveen Pappula, T Sampath Kumar, "Predicting Hypothyroid Disease using Ensemble

Models through Machine Learning Approach", European Journal of Molecular & Clinical Medicine, 2022, Volume 9, Issue 7, Pages 6738-6745. https://ejmcm.com/article_21010.html

[5] G. Van Noort and L. M. Willemsen, "Online damage control: The effects of proactive versus reactive webcare interventions in consumer-generated and brand-generated platforms," *Journal of interactive marketing*, vol. 26, no. 3, pp. 131–140, 2012.

[6] Mohammed Ali Shaik, "Time Series Forecasting using Vector quantization", International Journal of Advanced Science and Technology (IJAST), ISSN:2005-4238, Volume-29,Issue-4 (2020), Pp.169-175.

[7] A. Kumar, A. Ekbal, D. Kawahra, and S. Kurohashi, "Emotion helps sentiment: A multi-task model for sentiment and emotion analysis," in *2019 International Joint Conference on Neural Networks (IJCNN)*. IEEE, 2019, pp. 1–8.

[8] T. Saha, A. Upadhyaya, S. Saha, and P. Bhattacharyya, "Towards sentiment and emotion aided multi-modal speech act classification in twitter," in *Proceedings of the 2021 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*, 2021, pp. 5727–5737.

[9] M. S. Akhtar, A. Ekbal, and E. Cambria, "How intense are you? predicting intensities of emotions and sentiments using stacked ensemble [application notes]," *IEEE Computational Intelligence Magazine*, vol. 15, no. 1, pp. 64–75, 2020.

[10] Mohammed Ali Shaik, T. Sampath Kumar, P. Praveen, R. Vijayaprakash, "Research on Multi-Agent Experiment in Clustering", International Journal of Recent Technology and Engineering (IJRTE), ISSN: 2277-3878, Volume-8, Issue-1S4, June 2019, Pp. 1126-1129

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