JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

A Survey on Automatic AccidentInsurance claim

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ABSTRACT

These days, data plays a central role and serves as a significant asset in the insurance industry. In the current landscape, the insurance sector plays a vital role in our journey. The innovative approach to revolutionize insurance claims processing in response to the escalating number of accidents linked to the growing vehicle population. The system comprises three key elements: reidentifying vehicle make and model, identifying damaged components with type and severity, and generating accurate repair estimates through damage component identification. Additionally, the system streamlines documentation by automatically extracting relevant fields from user-provided voice input, ensuring mutual benefits for all involved parties. The solutions are crafted using Artificial Intelligence techniques, specifically leveraging CNN models and Natural Language Processing methods.

Keywords-component : Automated claims processing ,Geolocation Tracking, Sensor Data, Image recognition, Real Time analytics, CNN model.

I. INTRODUCTION

In the dynamic landscape of the insurance industry, there is a growing need for innovative solutions that enhance efficiency and provide a seamless experience for policyholders. One area where technological advancements can make a significant impact in processing insurance claims, particularly in the context of accidents. The traditional process of filing and assessing claims can be time-consuming, often involving manual documentation and complex procedures. The current process of filing a claim typically requires extensive paperwork, physical inspection of damages, and can result in prolonged waiting periods for claim approval. This not only inconveniences the policyholders but also poses challenges for insurance companies in managing and processing claims efficiently.

II. LITERATURE SURVEY

The estimation of car damage costs by using image data has been a research challenge in the insurance industry. The efforts prove that there is a lot of potential for using images to estimate the damage severity of a vehicle which could revolutionise the insurance userexperience.The method could help by shortening

the length of time needed for the insurance company to resolve a claim. Thus saving time and money for both parties, while increasing customer satisfaction. The proposed system can reduce the number of false positives, which has the potential to save significant amounts of money for a large insurance company. The current improvements in deep learning and the adequate use of proprietary and public data can help an insurance organisation develop a full pipeline to improve its services. One of the main remaining challenges is to further refine the pipeline to give a more granular prediction about the damage to vehicle parts in order to improve prediction accuracy.[1]

Image analysis methods extract information from an image by using semi-automatic or automatic techniques termed: image understanding, image description, scene analysis, pattern recognition, computer/machine vision etc. Image analysis is different from the various other types of image processing methods, such as the restoration or enhancement in that the end result of image analysis procedures is a numerical output rather than an image or some pictorial output. By analyzing different techniques in literature review we conclude different technologies used to provide solutions for insurance companies. 3D model of car and other latest papers uses CNN model and categories different types of damages which provide efficient machine learning concepts to predict cost evaluation for damage[2].

Automatic Car Insurance using Image Analysis presents a solution to automate insurance claim processing which addresses the drawbacks identified such that it offers near real-time claims processing in minutes enabling users to process their claims quicker with fewer frauds in the process. The solution will identify whether the accident-met vehicle is the same as the insured vehicle and then automatically fill the initial claims form using speech recognition. The automated form-filling component in this research can convert voice input which contains details related to the accident into text paragraphs. The system will identify 9 custom fields in the voice input such as details of the claimant, accident and damage then categorize and arranged them into the form format using NER model. The research also proposes a method for external damage detection and claims cost calculation based on damage component, type, and severity. For this work, the EfficientNetB3 architecture model was used to identify the exact damage component and the damage type and then classified the damage severity for three severity levels respectively minor, moderate, and major using a VGG16 architecture model, also the system contains two validation models to identify whether the image is a vehicle or not and to identify whether the images are damaged or not. The total claims amount was calculated for all the damaged images by considering the damage component, type, and severity using a rule-based classification. As a future development of the project, it is expected to improve the ASR to identify more fields which related to filling in the initial claims requesting form and include other local languages. The solution presented can identify only 1 damage in an image. This can be improved to detect more than 1 damage in an image with the advancement of computer vision technologies.[3].

Modern technologies are moving extremely fast making their ways into various fields of the business. In this respects, the insurance industry does not lack behind the others. The application of statistics in the insurance has a long history. Thus, the fact that insurance companies are actively using data science

analytics is not amazing. In essence, the aim of applying data science analytics in the insurance is the same as in the other industries—to optimize marketing strategies, to improve the business, to enhance the income, and to reduce costs. In the paper, they presented several machine learning techniques to analysis the insurance claims efficiently and compare their performances using various metrics[4].

The end-to-end unified framework to robustly perform driver drowsiness detection, remote monitoring, and evaluation. The system consists of four key building blocks, including an embedded platform, edge computing, cloud computing, and an interactive user interface for both driver and admin to perform a set of functionalities. This work relied on the use of computer vision techniques to detect the drowsiness of drivers, aimed primarily for a use casein which a driver is driving a public or logistic transport for longer routes. Unlike existing works, the proposed system offers a more holistic and effective end-to-end framework,covering drowsiness detection, remote monitoring, as well as automated evaluation by using IoT infrastructure. The system has obtained a very encouraging performance for drowsiness detection in terms of achieving promising scores for Precision, Recall, F1-score, and Accuracy measures for the four defined classes: Active, Yawning, Eyes Closed, and Distraction. [5].

The designed security system for vehicle based on driver's license and fingerprint technology.This system prevents vehicle theft and driving without proper driving license. It achieved through select authorized driver's license his/her holder allows running the car, also to provide extra security the system contains biometrics in form of fingerprint recognition to grant access to vehicle. To prevent all possible ways to vehicle theft, GSM module is used to send SMS alter to the owner of car tell him unauthorized driver's license entered. Also used GSM module to send SMS to holder of driver's license for remember him to renewal his license before expiry. As a result the vehicle doesn't start only when the authorized driver's license entered after that verify the authorized fingerprint if these two conditions are achievedthe car will be running else, the system block the vehicle ignition. That the General Traffic Department establish a database that includes the car's data, the driver's license of its owner and the licenses authorized by the owner of the car to be able to drive his car, as well as fingerprints. If installed in all the vehicles, it will be of use for society as well as the law enforcement department. The big vehicles companies allocate a place for RFID reader to be able to read a driver's license .[6]

The IoT-based Smart Accident Detection and Insurance Claiming System (ISADICS) presented in this paper aims to address critical issues associated with post-accident response and management. By leveraging the capabilities of sensor-equipped vehicles, the system not only monitors the real-time status of the vehicle and its surroundings but also takes proactive measures to minimize the aftermath of accidents.The implementation of ISADICS ensures swift communication with emergency services such as nearby hospitals and law enforcement agencies, enabling a rapid response to accidents. This timely intervention is crucial in reducing fatality rates and providing immediate medical attention to those injured in accidents. Furthermore, the system streamlines the insurance claiming process, alleviating the burden on individuals and ensuring a more efficient and transparent procedure.[7]

Vehicle Insurance Fraud Detection System Using Robotic Process Automation and Machine Learning

presented in this paper aims to highlights the significant role that Robotic Process Automation (RPA) can play in the insurance sector, specifically in addressing the challenges associated with vehicle insurance and fraud detection. The conventional insurance processes, which involve repetitive tasks and manual interventions, can be streamlined and automated using RPA. This not only leads to improved business efficiency but also contributes to enhanced productivity, data security, reduced cycle time, and increased accuracy.The authors emphasize the potential of RPA as a catalyst for a transformative "bot revolution" within organizations. The integration of RPA with Machine Learning (ML) techniques further enhances the system's intelligence, particularly in the context of vehicle fraud detection in the insurance domain. By automating the collection of policyholder's details and essential information from previous claims documents, insurers can streamline the insurance claims settlement process.The paper presents the implementation of Linear Discriminant Analysis (LDA) as an effective ML technique for vehicle fraud detection, achieving a notable accuracyof 90%. This underscores the efficacy of combining RPA and ML to create intelligent systems capable of distinguishing between legitimate and fraudulent insurance claims.[8]

The traditional approach to fraud detection, centered around developing heuristics based on fraud indicators, has limitations in effectively addressing the evolving landscape of fraudulent activities. The paper focuses on a more advanced and proactive solution by employing machine learning techniques for the detection of auto/vehicle insurance fraud, particularly in the context of fake accident claims.The emphasis on machine learning brings a data-driven and intelligent approach to fraud detection, allowing for a more dynamic and adaptive system. The performance evaluation, conducted through the calculation of a confusion matrix, provides valuable insights into the effectiveness of the proposed approach. Metrics such as accuracy, precision, and recall serve as benchmarks for assessing the model's ability to correctly identify fraudulent auto/vehicle insurance claims.By leveraging machine learning, the paper suggests a promising avenue for improving fraud detection capabilities within the insurance industry. The comparison of performance metrics helps stakeholders in the insurance sector make informed decisions about the efficacy of adopting machine learning techniques in their fraud detection strategies.[9]

Introduces an application designed for the automatic detection and classification of vehicle damages, offering practical utility for insurance companies in claims processing and the police department in accident record-keeping. The manual identification of damage types and severity after accidents can be a cumbersome task, making automated solutions crucial for streamlining the insurance claim process.The study explores the application of Convolutional Neural Networks (CNN), leveraging pre-trained models such as MobileNet and VGG19. Notably, the focus is on adapting these models for the multiclass classification of vehicle damages, a domain where CNNs have not been extensively explored. To enhance the model'sperformance, transfer learning is applied to a large constructed dataset. The investigation also addresses overfitting concerns and aims to train the model to capture more general features.

The significance of this work lies in its contribution to improving the efficiency of damage assessment in the aftermath of accidents, which is vital for both insurance companies and lawenforcement agencies. By

harnessing the capabilities of CNNs and transfer learning, the paper showcases a practical application that addresses the complexities of multiclass vehicle damage classification.[10]

Developed SISBAR, a novel fraud detection system for insurance firms based on permissioned blockchain and machine learning algorithms. Selected two learning strategies for detection and classification of fraudulent claims submissions out of a pool of learning techniques based on experimental performance on a real insurance firm's data. Investigated the use of XGBoost and VFDT algorithms for batch and incremental learning strategies to detect and classify different types of fraudulent auto insurance claims and measure risk level of customers. The performances of the proposed algorithms are compared to those of other state-of-the-art solutions. It is shown that the proposed classifiers ensure not only the best accuracy in detecting fraudulent claims but also can classify different types of fraud for insurance unlike the existing solutions. Moreover, XGBoost proved its efficiency in predicting customers' future behavior and their future claims amount. An implementation of the blockchain, AI modules, and essential structural nodes were developed to perform tests and simulations on different actors of the proposed framework. SISBAR presents a basis for insurance companies to decrease their claim refund losses, improve their performance, and their competitiveness. This in turn leads to savings for the insurance clients that act lawfully.[11]

Vehicle Damage Analysis Using Computer Vision presented in this paper addresses a significant challenge in the transportation industry – the manual inspection of vehicle damage, which is time-consuming. Recognizing the potential for automation in the vehicle insurance sector, the paper introduces a segmentation method based on machine learning for detecting vehicle damage. Utilizing photos taken at the scene of accidents for insurance claims can streamline the process, saving time, reducing costs, and enhancing driver convenience. By leveraging CNNs, the research contributes to widening the scope of auto insurance and damage detection. The emphasis on machine learning and computer vision techniques signifies a shift towards more automated and efficient methods for assessing vehicle damage. This not only benefits insurance companies by expediting claims processing but also enhances overall convenience for drivers involved in accidents.[12]

The estimation of changes in the main insurance premium driver, a company's insured revenue, through the application of a random forest classification model. The focus was primarily on general liability insurance, which offers coverage for damages resulting from a business'soperations.customer's motor vehicle insurance policy can effectively classify businesses into categories of shrinking, stable, and growing. This classification system provides valuable insights for insurance companies seeking to assess and adjust their premiums in a more targeted and efficient manner.The potential integration of this model into an insurance Customer Relationship Management (CRM) system offers a practical and economically viable solution.[13]

Extreme gradient boosting machine learning algorithm for safe auto insurance operations presented in this paper aims to investigate the use of XGBoost machine learning algorithm to detect and classify different types of fraudulent auto insurance claims. The performances of the proposed algorithms are compared to

those of other state-of-the-art solutions: naive bayes, nearest neighbor, and decision tree algorithms. After applying data analysis and exploration techniques to select the most relevant features of the auto insurance dataset, evaluate the algorithms for different metrics. The experimental results show that the boosted classifier ensures not only the best accuracy in detecting fraudulent claims but also can classify different types of fraud in Insurance unlike the existing solutions. [14]

With the increasing significance of insurance in society, the need to effectively detect and prevent fraudulent cases has become paramount. While customers seek security for their properties and vehicles, insurance companies face the challenge of rising fraudulent activities.One of the prominent techniques highlighted is the Naive Bayesian model, which has proven to be a powerful tool for fraud detection in the automobile insurance domain. The Bayesian visualization approach was employed to analyze and interpret the predictions made by the classifier. However, it was noted that this visualization technique may face limitations when dealing with abundant data containing relatively few instances of fraud. To address this limitation, survey proposes the adoption of Fuzzy Logic, where in fuzzy rules are formulated to enhance fraud detection. Fuzzy Logic provides a more adaptable framework for handling diverse datasets and variables, promising improved accuracy in fraud detection. The proposed technique is set to be implemented on a larger scale, involving a greater number of datasets and variables.[15]

III. BLOCK DIAGRAM

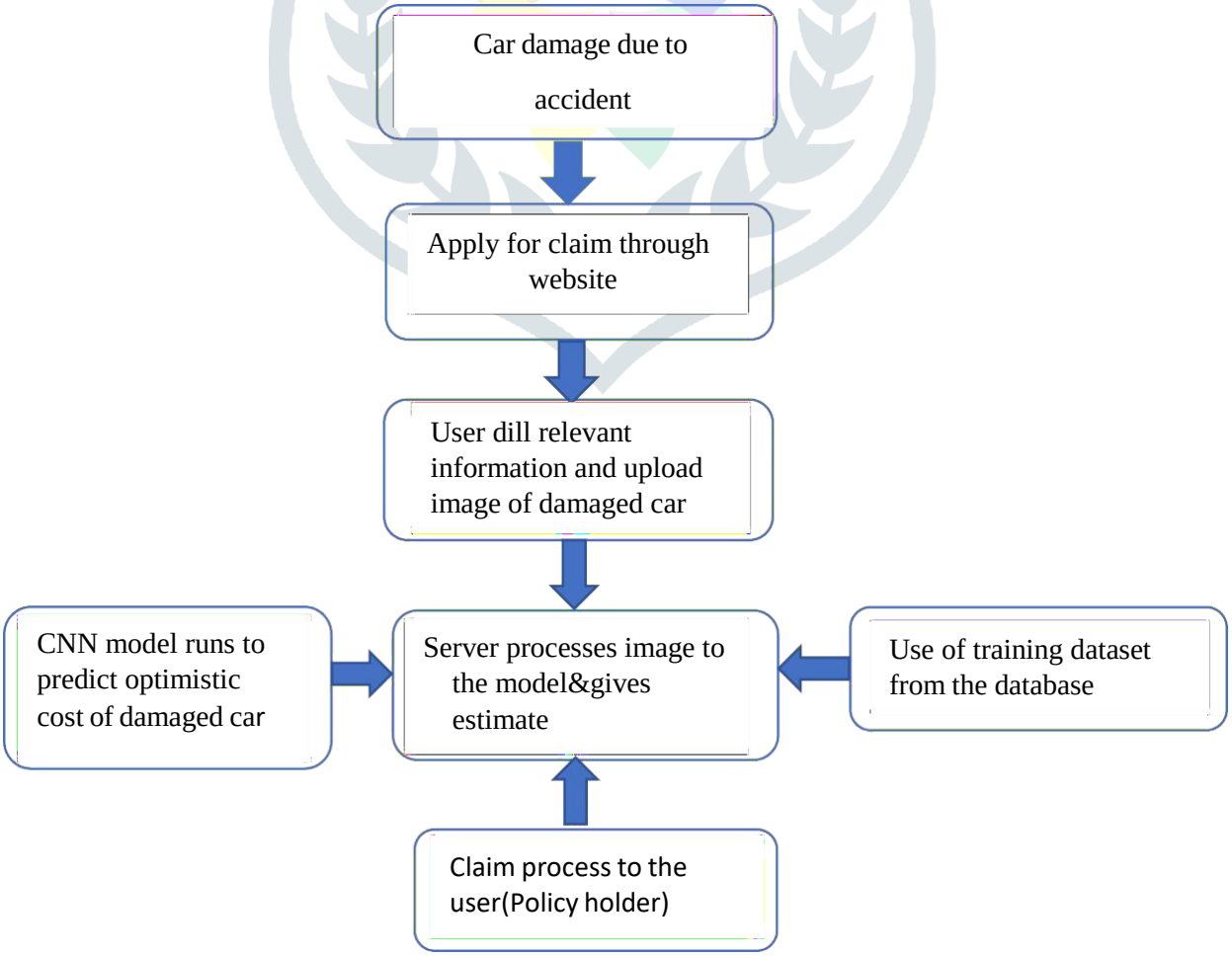

Fig: Automatic Vehicle Damage Assessment and Cost Estimation System

IV. CONCLUSION

The adoption of Automatic Accident Insurance Claim systems marks a pivotal advancement in the insurance industry. The integration of automation, data connectivity, and real-time communication, brings about a paradigm shift in how insurance claims are reported, processed, and settled. The primary advantage lies in the expeditious nature of these systems. Automation significantly reduces the time between the occurrence of an accident and the initiation of the claims process. Swift notification through these systems facilitates prompt response from insurance companies, leading to quicker assessment, validation, and subsequent settlement of claims. This speed not only benefits policyholders by reducing the waiting period but also enhances the overall efficiency of the insurance ecosystem. Moreover, the accuracy and reliability of information in automatic accident insurance claims contribute to fair and precise evaluations.

V. REFERENCES

[1]. Mallios, Dimitrios, Li Xiaofei, Niall McLaughlin, Jesus Martinez Del Rincon, Clare Galbraith, and Rory Garland. "Vehicle damage severity estimation for insurance operations using in-the-wild mobile images." IEEE Access (2023).

[2]. Fernando, Nisaja, Abimani Kumarage, Vithyashagar Thiyaganathan, Radesh Hillary, and Lakmini Abeywardhana. "Automated vehicle insurance claims processing using computer vision, natural language processing." In 2022 22nd International Conference on Advances in ICT for Emerging Regions (ICTer), pp. 124-129. IEEE, 2022.

[3]. Gupta, Aniket, Jitesh Chogale, Shashank Shrivastav, and Rupali Nikhare. "Automatic Car Insurance using Image Analysis." International Research Journal of Engineering and Technology (IRJET) 7, no. 04 (2020): 2395-0056.

[4]. Burri, Rama Devi, Ram Burri, Ramesh Reddy Bojja, and Srinivasa Rao Buruga. "Insurance claim analysis using machine learning algorithms." International Journal of Innovative Technology and Exploring Engineering 8, no. 6 (2019): 577-582.

[5]. Khan, M. Adil, Tahir Nawaz, Umar S. Khan, Amir Hamza, and Nasir Rashid. "IoT-Based Non-Intrusive Automated Driver Drowsiness Monitoring Framework for Logistics and Public Transport Applications to Enhance Road Safety." IEEE Access 11 (2023): 14385-14397.

[6]. Ali, Arwa M., Heisum M. Awad, and Ibrahim K. Abdalgader. "Authenticated Access Control for Vehicle Ignition System by Driver's License and Fingerprint Technology." In 2020 International Conference on Computer, Control, Electrical, and Electronics Engineering (ICCCEEE), pp. 1-6. IEEE, 2021.

[7]. Narayanan, K. Lakshmi, C. Ramasamy Sankar Ram, M. Subramanian, R. Santhana Krishnan, and Y. Harold Robinson. "IoT based smart accident detection & insurance claiming system." In 2021 Third international conference on intelligent communication technologies and virtual mobile networks (ICICV), pp. 306-311. IEEE, 2021.

[8]. Patil, Nirmala S., Spoorthy Kamanavalli, Soujanya Hiregoudar, Sonam Jadhav, Suvarna Kanakraddi, and Namratha D. Hiremath. "Vehicle insurance fraud detection system using robotic process automation and machine learning." In 2021 International Conference on Intelligent Technologies (CONIT), pp. 1-5. IEEE, 2021.

[9]. Roy, Riya, and K. Thomas George. "Detecting insurance claims fraud using machine learning techniques." In 2017 international conference on circuit, power and computing technologies (ICCPCT), pp. 1-6. IEEE, 2017.

[10]. Khan, Maleika Heenaye–Mamode, Mohammad Zafir Hussein Sk Heerah, and Zuhairah Basgeeth. "Automated detection of multi-class vehicle exterior damages using deep learning." In 2021 International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME), pp. 01-06. IEEE, 2021.

[11]. Dhieb, Najmeddine, Hakim Ghazzai, Hichem Besbes, and Yehia Massoud. "A secure ai-driven architecture for automated insurance systems: Fraud detection and risk measurement." IEEE Access 8 (2020): 58546-58558.

[12]. Doshi, Shreyansh, Amarjit Gupta, Jay Gupta, Nidhi Hariya, and Aruna Pavate. "Vehicle Damage Analysis Using Computer Vision: Survey." In 2023 International Conference on Communication System, Computing and IT Applications (CSCITA), pp. 132-135. IEEE, 2023.

[13]. D. Müller and Y. -F. Te, "Insurance premium optimization using motor insurance policies — A business growth classification approach," 2017 IEEE International Conference on Big Data (Big Data), Boston, MA, USA, 2017, pp. 4154-4158, doi: 10.1109/BigData.2017.8258437.

[14]. Dhieb, Najmeddine, Hakim Ghazzai, Hichem Besbes, and Yehia Massoud. "Extreme gradient boosting machine learning algorithm for safe auto insurance operations." In 2019 IEEE international conference on vehicular electronics and safety (ICVES), pp. 1-5. IEEE, 2019.

[15]. Supraja, K., and S. Jessica Saritha. "Robust fuzzy rule based technique to detect frauds in vehicle insurance." In 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS), pp. 3734-3739. IEEE, 2017.