Literature Survey

S.No	TITLE	AUTHOR	YEAR	FINDINGS	ADVANTAGES
1.	Deep Learning-Based Car Damage Classification and Detection	Mahavir Dwivedi, Hashmat Shadab Malik, S. N. Omkar, Edgar Bosco Monis, Bharat Khanna, Satya Ranjan Samal, Ayush Tiwari & Aditya Rathi	2019	In this paper, they have worked on the problem of vehicle damage classification/detection which can be used by insurance companies to automate the process of vehicle insurance claims in a quick fashion. The recent advances in computer vision largely due to the adoption of fast, scalable and end-to-end trainable convolutional neural networks make it technically feasible to recognize vehicle damages using deep convolutional networks. They manually collected and annotated images from various online sources containing different types of vehicle damages.	Using CNN models pre-trained on ImageNet dataset and using several other techniques to improve the performance of the system, they theyre able to achieve top accuracy of 96.39%, significantly better than the current results in this work. Furthermore, to detect the region of damage, they used state-of-the-art YOLO
2.	Who Is Liable When a Driverless Car Crashes?	Muhammad Uzair	2021	This work discusses all those aspects which should be considered in order to find out who is	The work comprehensively discusses different liabilities ranging

				liable, i.e., an operator, owner, manufacturer, government entity, software provider, network provider, original equipment manufacturer (OEM), etc., as traditional tort rules will not help to find out the liability in case of an AV accident.	from legal, civil, operator, criminal, moral, product, insurance, etc., to find out who is liable in case of an AV accident, as compared to the existing literature which generally discusses one or two aspects only.
3.	Improving Automobile Insurance Claims Frequency Prediction with Telematics Car Driving data	Shengwang Meng, He Wang, Yanlin Shi and Guangyuan Gao	2021	In this paper, with automobile insurance claims data and associated telematics car driving data, they propose a supervised driving risk scoring neural network model. This one-dimensional convolutional neural network takes time series of individual car driving trips as input and returns a risk score in the unit range of (0,1).	After compared with non-telematics-based insurers, telematics-based insurers can discover more heterogeneity in their portfolio and attract safer drivers with premiums discounts.
4.	Machine Learning Approaches for Auto Insurance Big Data	Mohamed Hanafy and Ruixing Ming	2021	This study considers how automotive insurance providers incorporate machinery learning in their company, and explores how ML models can apply to insurance big data. They have utilized various ML methods,	This paper's main objective is to create an ML algorithm that accurately predicts claims occurrence. Thus, the model must effectively consider consumer details, such as the type of

				such as logistic regression, XGBoost, random forest, decision trees, naïve Bayes, and K-NN, to predict claim occurrence. Furthermore, they evaluate and compare these models' performances.	vehicle or the car's cost, that differ among the clients. The model's results (and provided that the forecast is accurate) confirmed that car insurance firms will make insurance coverage more available to more clients.
5.	Assessing Car Damage with Convolutional Neural Networks	Harit Bandi; Suyash Joshi; Siddhant Bhagat; Amol Deshpande	2021	This paper deals with estimating car damage, primarily with auto insurers as our key potential customers. For this purpose, three distinct Transfer Learning approaches are used which detect the presence of damage, location, and severity of the damage. The basis for algorithms used lies in Convolutional Neural Networks, customized to optimize accuracy.	This research fine-tunes a number of existing approaches and opens doors for collaboration in image recognition, particularly for the car insurance domain.
6.	Regional Analysis Of Car Insurance In Montenegro Using Deep Learning Methods	Vladimir Kašćelan, Ljiljana Kašćelan, Milijana Novović Burić	2021	This paper analyzes the regional distribution of the number of policies, total premiums and claims of 19486 legal entities as car insurance customers of one of the largest non-life insurance companies in Montenegro. Insureds	The research results are of particular importance to the insurance company, i.e. its marketing and actuary departments, in order to establish better communication, to

				are clustered using the k-means methods in four clusters: Poor-low risk, Middlelow risk, Theyalthy-middle risk and Luxury-high risk. The clusters are described using the Decision Tree (DT) models.	develop more successful marketing strategies and to better assess the risk by region for individual groups of policyholders of similar characteristics.
7.	Business Analytics and Car Insurance Mediation: a data driven model proposal	José Gonçalves Santos; Bernardo Abreu; Jorge Bernardino; Isabel Pedrosa	2021	This work allows companies to make more reality-oriented and data-based models. They suggest a "pay-as-you-drive" model, which allows car insurance companies to submit proposals based on a larger number of variables and adjusted to each insured person, a model built with data collection by insurance companies, in order to adjust the insurance premium.	The contribution of this work corresponds to a new model that balances the insurance premium with the probability of unwanted occurrences.
8.	Erie Insurance: Monitoring technology in the car insurance market and the issue of data privacy	Barbara A Manko	2021	The influence of big data affects all aspects of life, including insurance. With car insurance, companies have the ability to go beyond the traditional driving history and current usage questions to customize policies for each holder,	The car insurance companies must be aware of the ethics of their actions and work to protect user data. Erie Insurance Company is specifically analysed in this article as an example.

				especially with the introduction of monitoring technology that is either installed directly into the car or accessed via cell phone.	
9.	Assessing the Performance of Random Forests for Modelling Claim Severity in Collision Car Insurance	Yves Staudt, ORCID and Joël Wagner	2021	In this paper, they focus on the claim severity. First, they build two reference models, a generalized linear model and a generalized additive model, relying on a log-normal distribution of the severity and including the most significant factors. Thereby, they relate the continuous variables to the response in a nonlinear way. In the second step, they tune two random forest models, one for the claim severity and one for the log-transformed claim severity, where the latter requires a transformation of the predicted results. They compare the prediction performance of the different models using the relative error, the root mean squared error and the goodness-of-lift statistics in combination with goodness-of-fit statistics.	Random forests with a log-normal transformation are the favourite choice for explaining right-sketheyd claims. Finally, when considering all indicators, they conclude that the generalized additive model has the best overall performance.

10.	Deep Learning Based Car Damage Detection, Classification and Severity	Ritik Gandhi	2021	In this paper they are using various pre-trained models such as VGG 16, VGG 19,Resnet50 and Densenet and based on these models, selecting the best performing models. They initially check whether the car is damaged or not using the Resnet50 model and if it's a damaged one they use the WPOD-net model to detect the license plate. To identify the damaged region, they use the YOLO model. At last, comes the damage severity which is implemented using the Densenet model .	From the above models they can safely conclude that Resnet model works best to detect whether a car is damaged or not, YOLO models to identify the car damage classification and the densenet model to check the severity of the car damage. Regarding the proposed models there are still overfitting issues but there is still room for improvements in terms of accuracy