

Project report: Classification model CAR INSURANCE FRAUD DETECTIONS

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• Problem:

With the large number of traffic accidents insurance companies receive claims for financial compensation to the beneficiaries, and with the many claims appear multiple fraud cases and undeserved financial claims, so insurance companies face difficulty in identifying and detecting fraud in car accidents, insurance companies need a solution to help them detect fraud and identify the factors and causes of fraud, based on all factors related to the accident.

• Solution :

So in this project, we are going to develop a classification model to detect fraud.

• Data Description:

This Dataset contains **34 columns** and more than **11000 record**The following table will explain the dataset in detail:

Columns	Туре	
Month	String	
WeekOfMonth	Integer	
DayOfWeek	String	
Make	String	
AccidentArea	String	
DayOfWeekClaimed	String	
MonthClaimed	String	
WeekOfMonthClaimed	Integer	
Sex	String	
MaritalStatus	String	
Age	Integer	
Fault	String	
PolicyType	String	
VehicleCategory	String	

VehiclePrice	Integer
FraudFound_P	Integer
PolicyNumber	Integer
RepNumber	Integer
Deductible	Integer
DriverRating	Integer
Days_Policy_Accident	Integer
Days_Policy_Claim	Integer
PastNumberOfClaims	Integer
AgeOfVehicle	Integer
AgeOfPolicyHolder	Integer
PoliceReportFiled	String
WitnessPresent	String
AgentType	String
NumberOfSuppliments	Integer
AddressChange_Claim	Integer
NumberOfCars	Integer
Year	Integer
BasePolicy	String
ClaimSize	Integer

• Tools:

Tools	Description			
Jupyter notebook	Contains cells of Python code and human-readable text			
pandas	The library is written in Python for data manipulation and analysis			
sklearn	Software machine learning library for the Python programming language			
Matplotlib	Matplotlib is a plotting library for Python			

• Results:

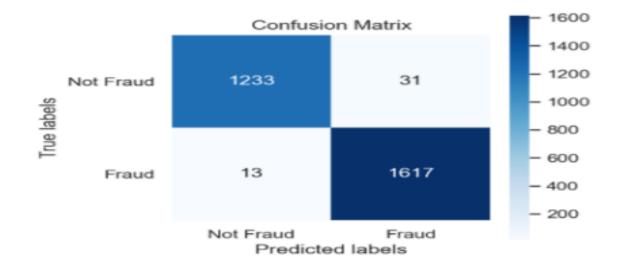
model	Test	F1	AUC	Log-Loss
	using all features	0.000	0.717	0.208
Logistic Regression	using some of the features	0.000	0.502	0.228
	using some of the features with dimensionality reduction	0.028	0.782	0.195
	using some of the features with Over- sampling using SMOTE	0.924	0.975	0.203
KNN	using some of the features	0.000	0.540	1.276
	After resampling & GridSearchCV	0.987	0.984	0.525
Random Forest	using some of the features	0.122	0.799	0.253
	using some of the features with Over- sampling using SMOTE	0.967	0.993	0.120
	using some of the features with RandomizedSearchCV & Over-sampling using SMOTE	0.964	0.992	0.152
xgboost	some of the features with Over-sampling using SMOTE	0.969	0.992	0.106
Support Vector Machine	Some of the features with Over-sampling using SMOTE	0.984	0.996	0.053

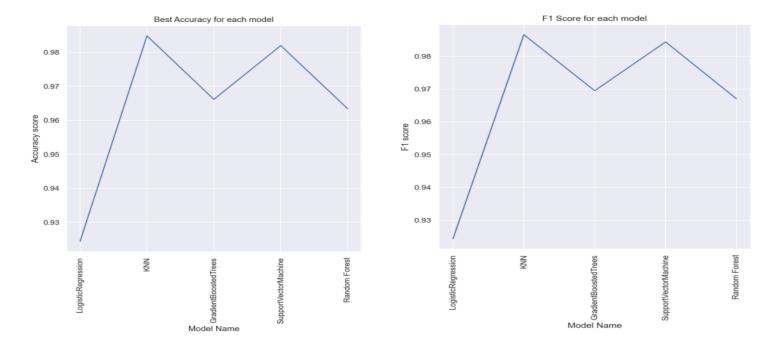
model	accuracy	f1-score	prediction	precision	recall	f1-score
Logistic Regression	0.94	0.92	Not Fraud	0.92	0.93	0.92
			Fraud	0.93	0.92	0.92
KNN	0.98 0.9	0.98	Not Fraud	0.99	0.98	0.98
			Fraud	0.98	0.99	0.99
Random Forest	0.96	0.96	Not Fraud	0.94	0.98	0.96
			Fraud	0.98	0.95	0.96
xgboost	0.97	0.96	Not Fraud	0.94	0.98	0.96
Aguoost			Fraud	0.98	0.96	0.97
Support Vector			Not Fraud	1.00	0.96	0.98
Machine	0.98	0.98	Fraud	0.97	1.00	0.98

• Best model:

model	Test	F 1	AUC	Log-Loss
KNN	After resampling & GridSearchCV	0.987	0.984	0.525

• Graphs





• Conclusion:

We made 5 models, We came up with the best model to do fraud detection After receiving the characteristics for each claim, the model will help insurance companies to help them detect fraud clime. We achieved very good accuracy (98%) in the best model!