AProjectReport

on

CARRESALEVALUEPREDICTION

Under the guidance

of**Industry**

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CHAPTER-1INTRODUCTION

1.1 PROJECTOVERVIEW

Thepriceofanewcarintheindustryisfixedbythemanufacturerwithsomeadditionalcostsincurredbythe Governmentintheformoftaxes.So,customersbuyinganewcarcanbeassuredofthemoneytheyinvesttobewort hy.But,duetotheincreasedpricesofnewcarsandthefinancialincapabilityofthecustomerstobuythem,UsedCar salesareonaglobalincrease.Therefore,thereisanurgentneedforaUsedCarPrice Prediction system which effectively determinestheworthinessofthecarusingavarietyoffeat ures.ExistingSystemincludesaprocesswhereasellerdecidesapricerandomlyand buyerhasnoideaaboutthecarandit'svalueinthepresentdayscenario.Infact,selleralsohasnoideaaboutthecar'sexistin gvalueorthepriceheshouldbesellingthecarat.Toovercomethisproblem,wehavedevelopedamodelwhichwillbehighl yeffective.RegressionAlgorithmsareusedbecausetheyprovideuswithcontinuousvalueasanoutputandnotacategori zedvalue.Becauseofwhichitwillbepossibletopredicttheactualpriceacarratherthanthepricerangeofacar.UserInterf acehasalsobeendevelopedwhichacquiresinputfromanyuseranddisplaysthePriceofacaraccordingtouser'sinputs.

1.2 PURPOSE

Carresalevaluepredictionhelpstheusertopredicttheresalevalueofthecardependinguponvariousfeat ureslikekilo-metresdriven,fueltype,etc.Thisresalevaluepredictionsystemismadeforgeneralpurposetojustpredicttheam ountthatcan beroughly acquiredbytheuser.Themostessentialelementsforforecastarebrandandmodel,perioduseofvehicle,mileage ofvehicle,geartypeandfueltypeutilisedinthevehiclejustasfuelutilisationpermileprofoundlyinfluencescosto favehiclebecauseofcontinuous changes in the costof a fuel.Inview of the differinghighlightsandfactors,andfurthermorewiththeassistanceofmasterinform ationthevehiclevalueforecasth asbeendoneprecisely.Thiscanenablethecustomerstomakedecisions.Duetothehighpricingofnewcarsalong withtheincapabilityofcustomerstoinvestinthem,second-handcarsalesareonaglobalincrease.Asecond-handcarpricepredictionsystemisrequiredtoeffectivelydeterminetheworthinessofthecarusingavarietyoffea tures.Itisimportanttoknowtheiractualmarketvaluewhilebothbuyingandselling.Havingafairestimateofthec ar'sworthisasureshotwaytoget thebestpossiblevaluefortheoldcar.Asaseller,he/shewantstogetthemaximumpricebuttheaimistheoppositef orthebuyerorthecardealer.So,tobecomeawareofsuchthingsshouldbegivenimportance.Needtocalculateresa levalueofthecarwiththehelpofthecorrectvaluationtooltoknowthemarketpriceorwhatcouldbethemarketprice

ofthevehicle.Tonegotiatewiththedealerorsellerwithduediligenceandendupinaprofitabledeal.Estimating the bestpriceforthecar.Gettinginsightintoindustryratesandtrends.Safeguardingagainst

underhandedpractices.Confidencefornegotiations.

CHAPTER-
2LITERATURESURVE
Y

2.1 EXISTINGPROBLEM

Transportationindustryisoneofthebackbonesoftheeconomy.Almosteveryonewantstheirowncartheseday, butmany prefertobuyusedcarsorsecond-handcarsbecauseofsomefactorslikeaffordabilityandeconomicconditions.

Usedcarsalesareonaglobalincreaseduetotheincreasedpriceof newcarsandthefinancialincapabilityofthecustomerstobuythenewcars.Theusedcarorsecond-handmarkethascontinuedtoexpand,asthereductioninthemarketofnewcars.Thesecond-handmarkethascreatedbusinessforbothbuyersandsellers.Nowadaysmostofthepeopleprefertobuyusedcars becauseoftheaffordablepriceanditcanalsoberesoldaftersomeyearsofusagewhichmaygetsomeprofit.Infact, thesellermaynothaveanideaaboutthecar'sexistingvalueinthepresentday'sscenarioorthepriceheshouldbesell ingthecarat.Buyertoomaynothaveanideaonthecaranditsvalue.So,theproblemariseswhenthesellerwantstofi xanaffordableaswellasaprofitableresalepriceforthecarwhichwouldbenefitboththesellerandbuyer.Thepric eofusedcarsdependsonmanyfactorssuchasmanufacturingyear,fueltype,kilometresdriven,transmissiontyp e,engine,etc.,Accuratelypredictingtheusedcarpricesrequiresexpertknowledgeduetotheirnatureofdepende nceonavarietyoffactorsandfeatures. Therefore, an efficientapplication or websitebuiltusing an effectiveevaluationmodeltopredicttheresalevalueofthecarisrequired.

2.2 REFERENCES

2.2.1 TITLE-

USEDCARPRICEPREDICTIONAUTHOR-

PrafulRane1,DeepPandya2,DhawalKotak3DESCRIPTI

ON

Thepriceofanewcarintheindustryisfixedbythemanufacturerwithsomeadditionalcostsincurredbythe Governmentintheformoftaxes.So,customersbuyinganewcarcanbeassuredofthemoneytheyinvesttobewort hy.But,duetotheincreasedpricesofnewcarsandthefinancialincapabilityofthecustomerstobuythem,UsedCar salesareonaglobalincrease.Therefore,thereisanurgentneedforaUsedCarPrice Prediction system which effectively determinestheworthinessofthecarusingavarietyoffeat ures.ExistingSystemincludesaprocesswhereasellerdecidesapricerandomlyand buyerhasnoideaaboutthecaranditsvalueinthepresent-dayscenario.Infact,selleralsohasnoideaaboutthecar'sexistingvalueorthepriceheshouldbesellingthecarat.T oovercomethisproblem,wehavedevelopedamodelwhichwillbehighlyeffective.RegressionAlgorithmsareu sedbecausetheyprovideuswithcontinuousvalueasanoutputandnotacategorizedvalue.Becauseofwhichitwill bepossibletopredicttheactualpriceacarratherthanthepricerangeofacar.UserInterfacehasalsobeendevelope

dwhichacquiresinputfromanyuseranddisplaysthePriceofacaraccordingtouser’sinputs.

2.2.2 TITLE-

VehiclePricePredictionusingSVMTechniquesAUTHOR-

S.E.Viswapriya,DarbukaSaiSandeepSharma,GandavarapuSathyaKiranDESCRIPTION

Thepredictionofpriceforavehiclehasbeenmorepopularinresearcharea,anditneedspredominanteffort and information about the experts of this particular field. The numberofdifferentattributesismeasuredandalsoithasbeenconsiderabletopredicttheresultinmorereliableandaccurate.Tofindthepriceofusedvehiclesawell-definedmodelhasbeendevelopedwiththehelpofthreemachine learning techniques such as Artificial Neural Network, Support Vector Machine andRandomForest.These techniques were used not on the individual items but for the whole group of dataitems.This datagrouphasbeentakenfromsomewebportalandthatsamehasbeenusedfortheprediction.Thedatamustbecollectedusingwebscraperthatwaswritten inPHPprogramminglanguage.

2.2.3 TITLE-

UsedCarsPricePredictionandValuationusingDataMiningTechniquesAU

THOR-AbdullaAlSharedDESCRIPTION

Unprecedentednumberofcarsbeingpurchasedandsold,usedcarpricepredictionisatopicofhighinterest.Becauseoftheaffordabilityofusedcarsindevelopingcountries,peopletendmorepurchaseusedcars.Aprimaryobjectiveofthisprojectistoestimateusedcarpricesbyusingattributesthatarehighlycorrelatedwithalabel(Price).Toaccomplishthis,dataminingtechnologyhasbeenemployed.Null,redundant,andmissingvalueswereremovedfromthedatasetduring pre-processing.Inthissupervisedlearningstudy,threeregressors(RandomForestRegressor,LinearRegression,andBaggingRegressor)havebeentrained,tested,andcomparedagainstabenchmarkdataset.Atrain-testsplitof80/20with40randomstateswasusedinallexperiments.

2.2.4 TITLE-

PredictionofResaleValueoftheCarUsingLinearRegressionAlgorithmAUTH

OR-KiranSDESCRIPTION

Acorrelationwitheachattributetothatoftargetattributeisfoundandlinearregressioncurvewiththetargetattributeisdrawn.Asafinalstepthetotalerrorandaccuracyismeasured.Thedemandforusedcarshasincreasedsignificantlyinthepastdecadeanditisprognosticatedthatwith Covid-19outbreakthisrequirementwillaugmentconsiderably.Hencetoenhancethereliability,withtheexpansionoftheusedcarmarket,amodelthatcanforecastthecurrentmarketpriceofausedautomobileon the basis of avarietyofcriteria.Thisanalysiscanbeusedtostudythetrendsintheindustry,offerbetterinsightintothemarket, and aid the community in its smooth workflow. The aim ofthisresearchpaperistopredictthecarpriceasperthedataset(previousconsumerdatalikeengine capacity,

distancetravelled,yearofmanufacture,etc.). The result ofthesealgorithmswill be analysed and basedontheefficiencyandaccuracyofthesealgorithms,thebestoneofthemcanbeusedfor thesaidpurpose.

2.3 PROBLEMSTATEMENTDEFINITION

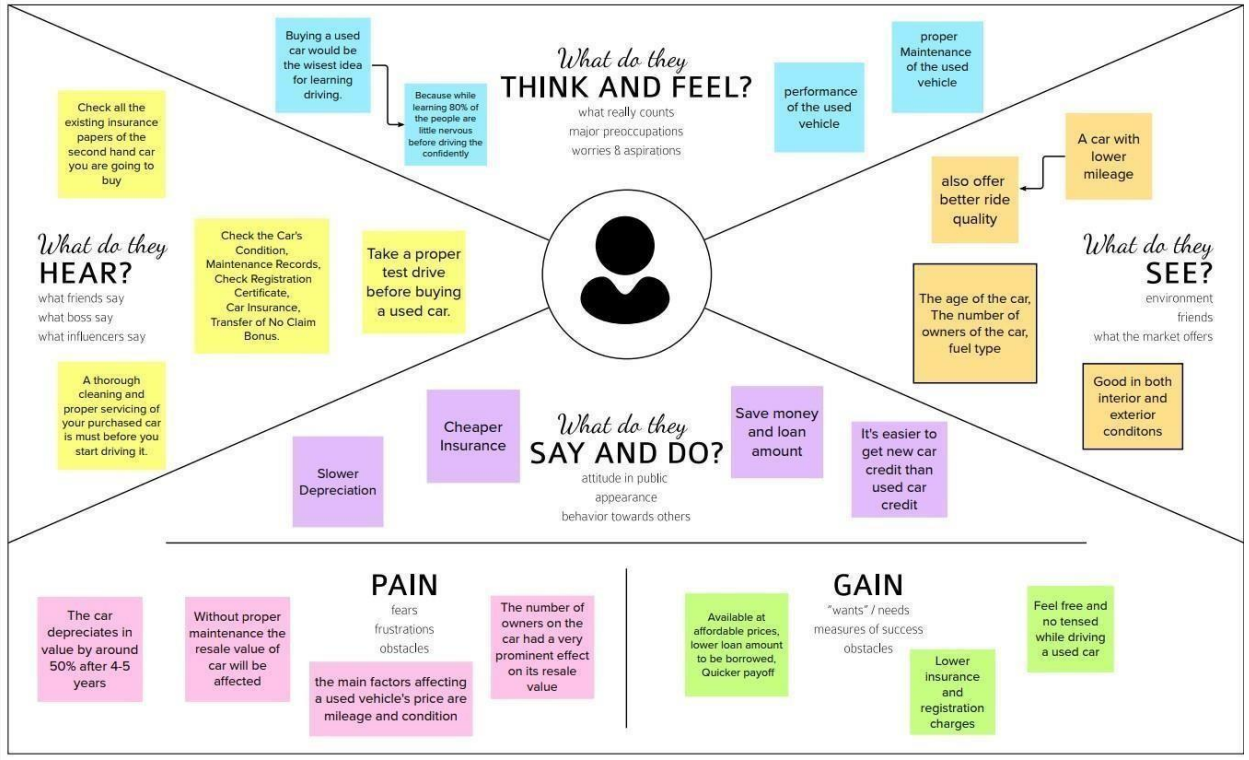
Withdifficulteconomicconditions,itislikelythatsalesofsecond-handimported(reconditioned)carsandusedcarswillincrease.Inmanydevelopedcountries,itiscommontoleaseacarratherthanbuyingitoutright.Aftertheleaseperiodisover,thebuyerhasthepossibilitytobuythecaratitsresidualvalue,i.e.,itsexpectedresalevalue.Thus,itisofcommercialinteresttosellers/financerstobeabletopredictthesalvagevalue(residualvalue)ofcarswithaccuracy.Therefore,weneedanintelligentsolutiontopredicttheaccurateresalevalue ofthecarandpresentittotheusersinawebapplication.

ProblemStatement(PS)	I am(Customer)	I'm trying to	But	Because	Which makes mefeel
PS-1	Ownerofthecar	Sellthecar	Don't know itsresalevalue	Ofwearandtearovertheyears(damagedue todailyuse)	Worried
PS-2	Ownerofthecar(highpriced/luxurycar)	Findresalevalueofthecar	Inadilemmaoffindingcorrectresalevalue	Of high priceandhighmaintenancecost	Confused
PS-3	Ownerofthecar	Sellthecar	Inurgeofselling the car in asatisfactoryprice	Urgent financial requirements	Frustrated

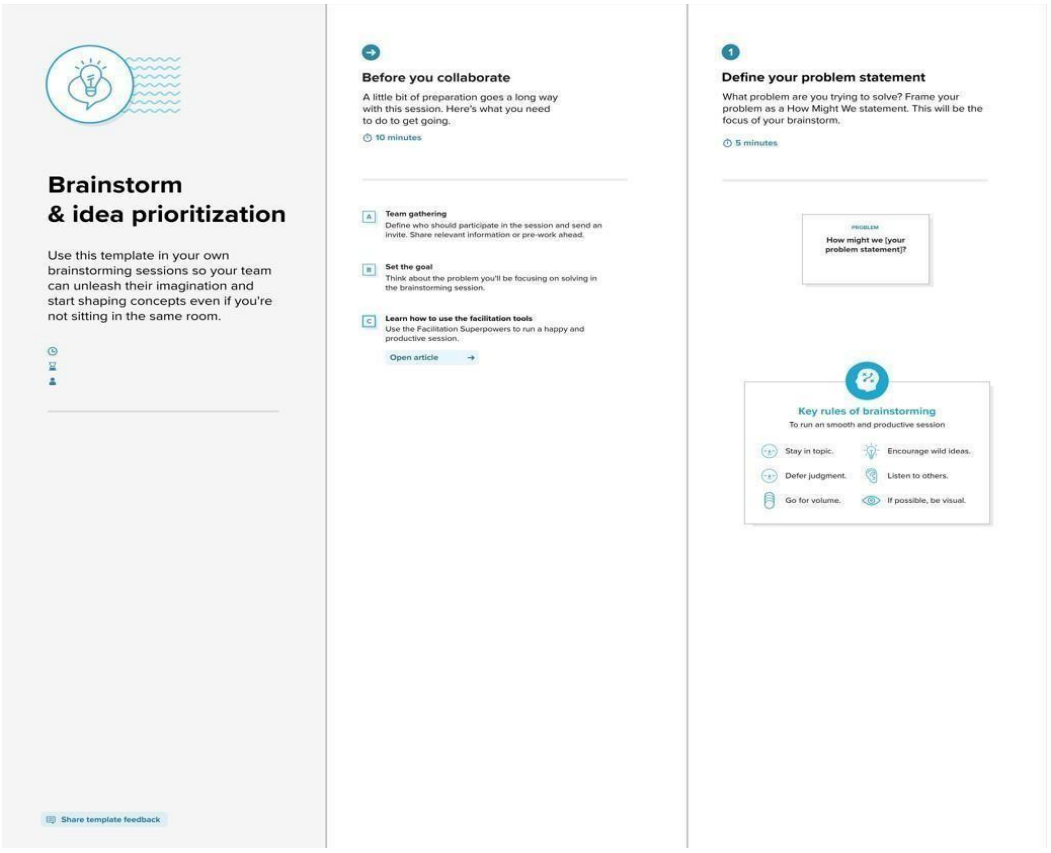
CHAPTER-

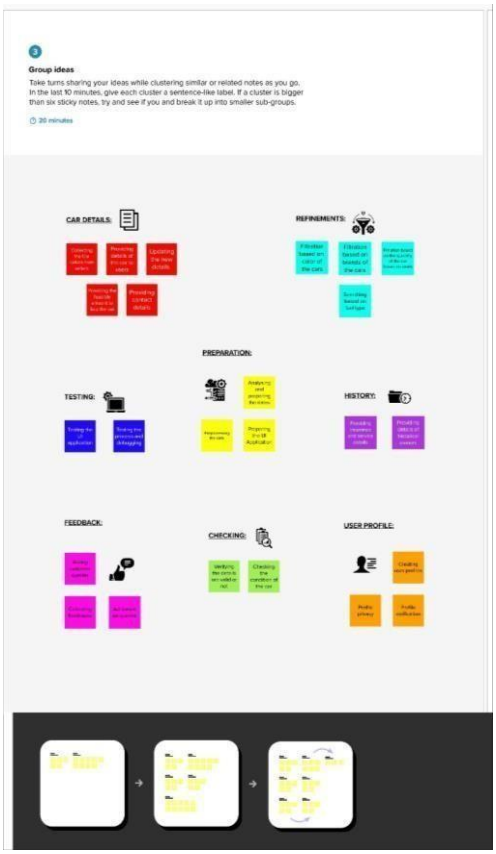
3IDEATION&PROPOSEDSOLUTION

3.1 EMPATHYMAPCANVAS



3.2 IDEATION&BRAINSTORMING




3
Group ideas
Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.
20 minutes
CAR DETAILS:
REFINEMENTS:
PREPARATION:
TESTING:
HISTORY:
FEEDBACK:
CHECKING:
USER PROFILE:

4
Prioritize
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.
20 minutes
Importance
Feasibility

2
Brainstorm
Write down any ideas that come to mind that address your problem statement.
10 minutes
Marcus Durairaj
Collecting the car details from sellers
Verifying the details are not valid
Checking the condition of the car
Filtration based on brands of the cars
Creating user profiles
Profile privacy
Malavika.T
Filtration based on color of the cars
Providing details of the car to users
Profile verification
Asking customers queries
Act based on queries
Collecting feedback
Saisathiya.R
Providing contact details
Searching based on fuel type
Analyzing and preparing the dates
Processing the date
Preparing the UI Application
Providing details of historical owners
Krithika Sree.T
Providing the feasible amount to buy the car
Providing insurance and service details
Testing the UI application
Testing the process and debugging
Updating the new details

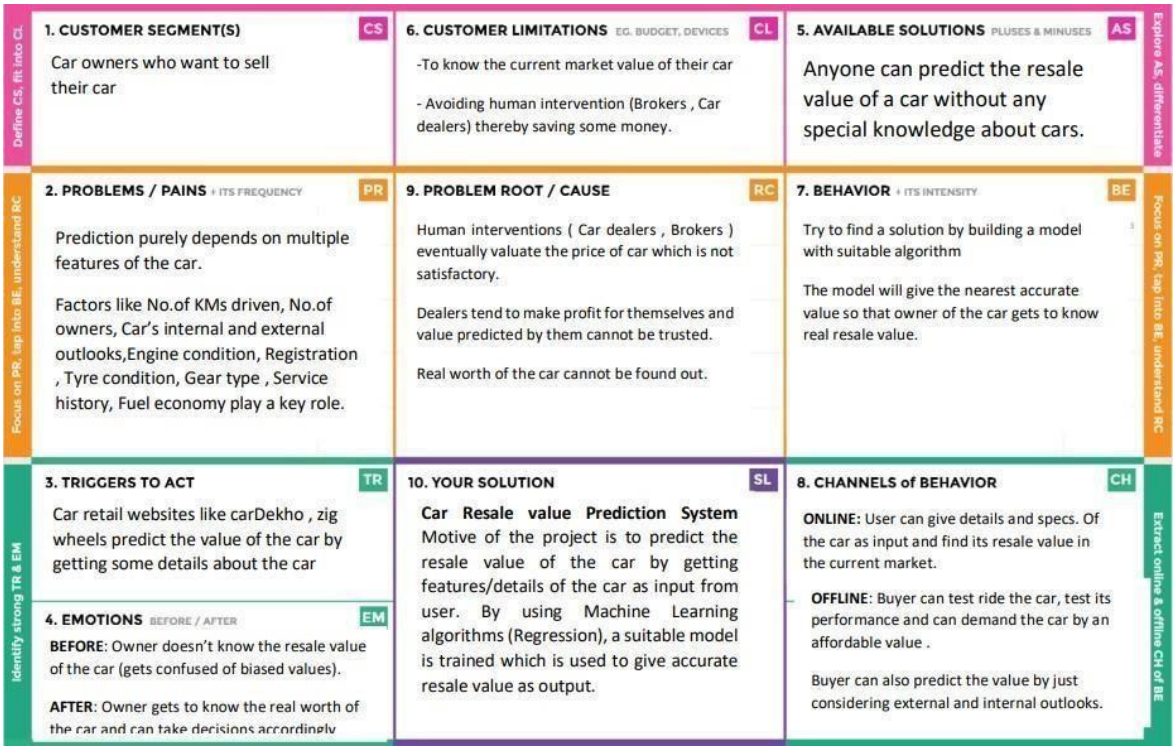
3.3 PROPOSEDSOLUTION

S.No.	Parameter	Description
1	ProblemStatement(Problemtobe solved)	Todevelopawebapplicationtopredicttheresale valueofacarbasedonitsfeatures
2	Idea/Solutiondescription	Totrainthesystemwiththedatasetandtrainthemusingaregressionmodel
3	Novelty/Uniqueness	Predictmoreaccuratevaluebasedontheinput givenbytheuser.
4	SocialImpact /CustomerSatisfaction	Customercangetaclearrecommendationoftheresale valueofthe carandbasedontheevaluation;customercantakedecisionsonsellingthecar.
5	Business Model(Revenue Model)	Freeandcanbeaccessedbyanyone.Predictionpurelydependsonfeaturesofthecar.
6	ScalabilityoftheSolution	Morethespecificdetails,morethaccuracy.Anaccurateresalevalueispredictedbythetrained model.

3.4 PROBLEMSOLUTIONFIT

Thesalesofsecond-handimportedcarsandusedcarsisincreasingnowadays.Predictingthepriceofusedcarsisanimportantandinteresting problem.Predictingtheresalevalueofacarisnotaneasytask.Itistriteknowledgethatthevalueofusedcars dependsonanumberoffactors.Thevalueofacardropsrightfromthemomentitisboughtandthedepreciationcontinueswitheachpassingyear.Infact,inthefirstyearitself,thevalueofacardecreasesby20percentofitsinitialvalue.Themakeandmodelofacar,totalkilometresdriven,overallconditionofthecarandvariousotherfactorsfurther affectthecar'sresalevalue.So,itisnecessarytobuildamodelanddesignanapplicationorwebsitetoestimatethepriceofusedcars.Themodelshouldtakecarrelatedparametersandoutputasellingpriceofthecar.Thesellingpriceofausedcardependsoncertainfeaturesasmentionedbelow:

- FuelType
- ManufacturingYear
- MilesDriven
- NumberofHistoricalOwners
- MaintenanceRecord,etc.,



CHAPTER–4REQUIREMENTANALYSIS

4.1 FUNCTIONALREQUIREMENT

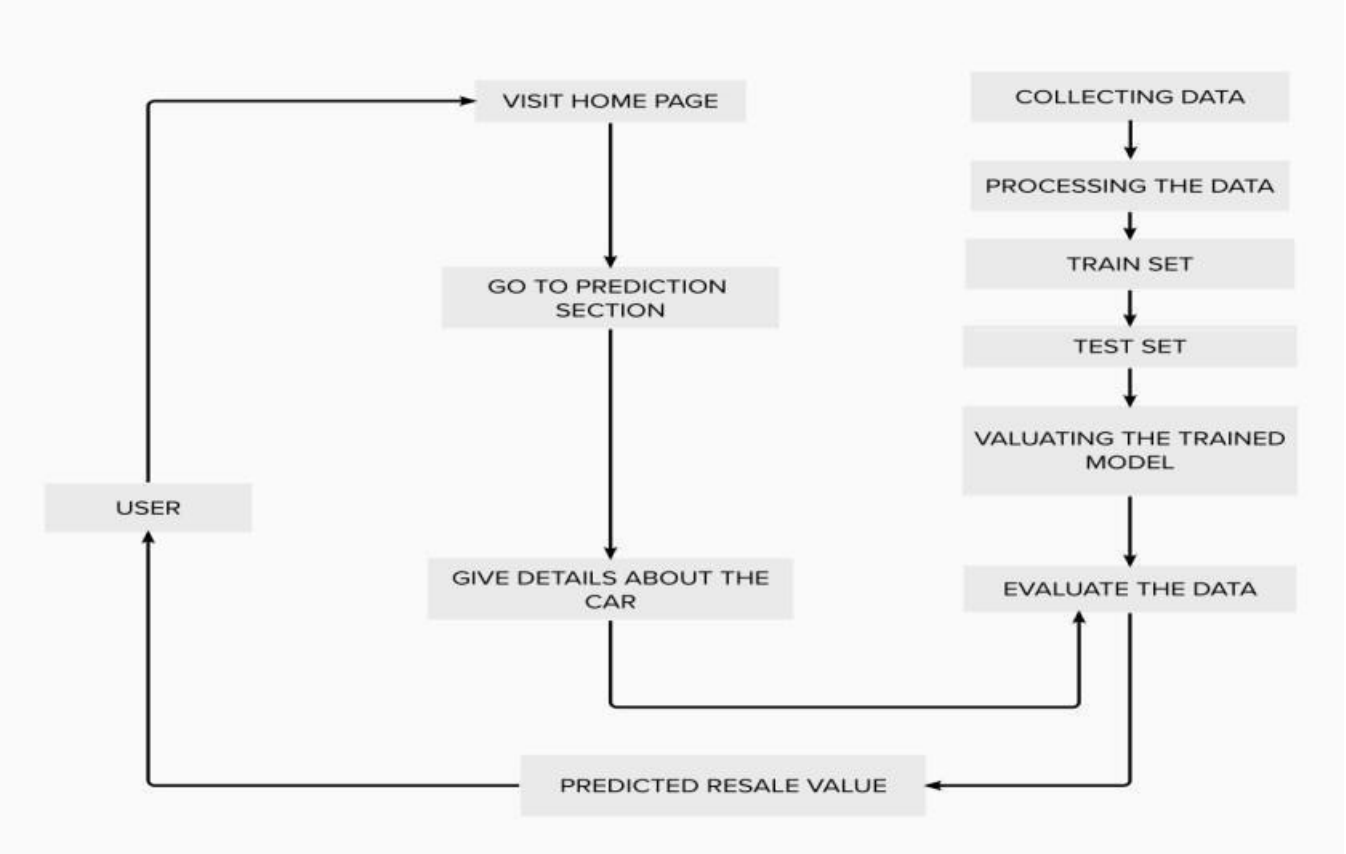
FRNo	FunctionalRequirement(Epic)	SubRequirement(Story/Sub-Task)
FR-1	UserOpensWebsite	ServerOpensthesite
FR-2	UserEnterstheValues	UserentersCardetails
FR-3	Validation	UserValuesChecksandvalidation
FR-4	Prediction	CarPricePrediction

4.2 NON-FUNCTIONALREQUIREMENTS

FRNo.	Non-FunctionalRequirement	Description
NFR-1	Usability	ASimple,User-friendlyuserinterfacewhichcangivesolutiontotheuser.(i.eresalevalue
NFR-3	Reliability	Reliableandconsistentpredictioncanbedone.
NFR-4	Performance	Performancedoesnotdependonamountofendusers.Itisscalable,consistentwithnodelay.
NFR-5	Availability	Uninterruptedservicesmustbeavailableotherthananyserverissues.
NFR-6	Scalability	Itcanhandleanyamountofdatairrespectiveofnumberofusers.Itcanperformcomputationsinafast&cost-effectivemanner.

CHAPTER-5PROJECTDESIGN

5.1 DATAFLOWDIAGRAMS



5.2 SOLUTION&TECHNICALARCHITECTURE

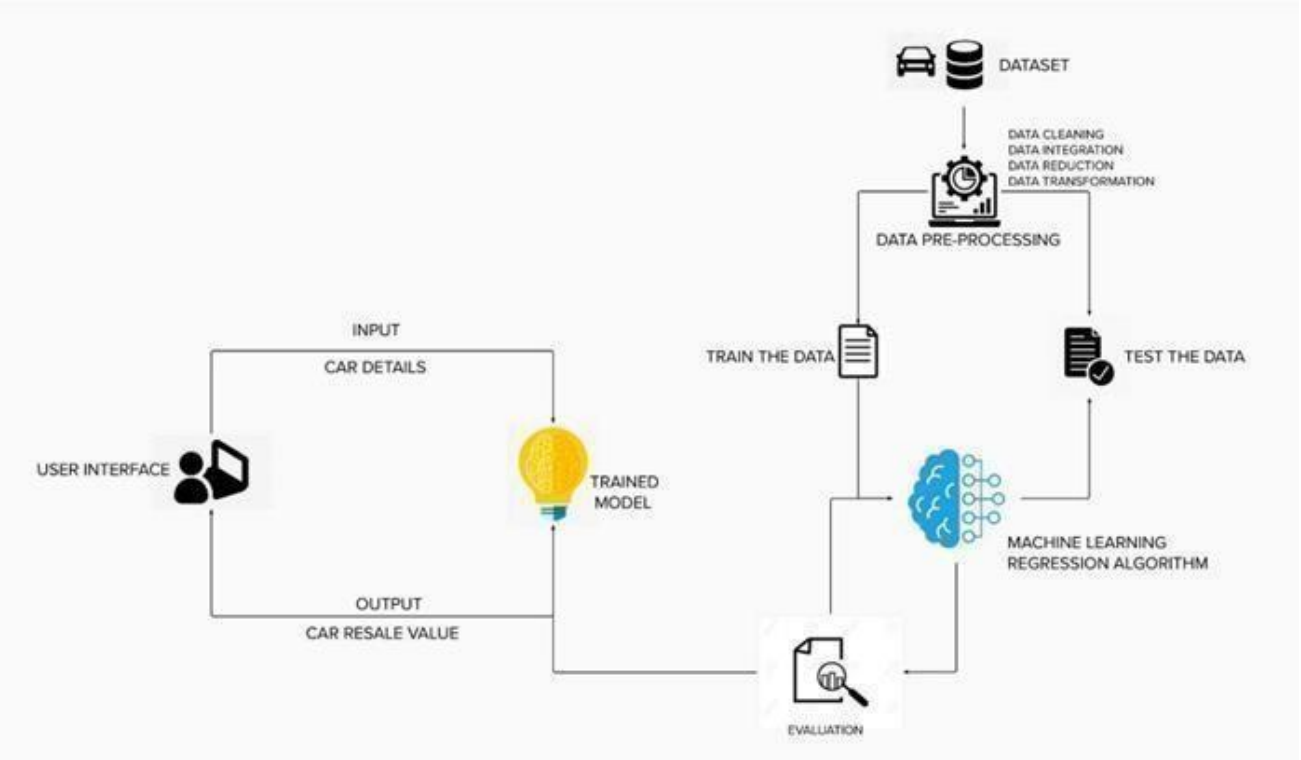
SolutionArchitectureisan architectural description ofaspecificsolution.Itisthepracticeofdesigning,describing,andmanagingsolutionengineeringtomatchitsspecificbusinessproblems.Itcomprisessubprocessesthatdrawguidancefromvariousenterprisearchitectureviewpoints.SolutionArchitectureistheinitialsteptakenwhenanorganizationaimstocreateasetofenterprisesolutions,applicationsandprocessesthatintegratewitheachotherinordertoaddressspecificneedsandrequirementsandthatoftenleadtosoftwarearchitectureandtechnicalarchitecturework.

Technicalarchitecture—whichisalsooftenreferredtoasapplicationarchitecture,ITarchitecture,business architecture, etc.—referstocreatinga structured software solution thatwillmeetthebusinessneedsandexpectationswhileprovidinga strongtechnicalplanforthegrowthofthesoftwareapplicationthroughitslifetime.ITarchitectureisequallyimportanttothebusinessteamandtheinformationtechnologyteam.Technicalarchitectureincludesthemajorcomponentsofthesystem,theirrelationships,andthecontractsthatdefinetheinteractionsbetweenthecomponents.Thegoaloftechnicalarchitectsistoachieveallthebusinessneedswithanapplicationthat is optimized for bothperformance

andsecurity.Thetechnical

architectureoftheproposedprojectisasfollows:

S.No	Component	Technology
1	UserInterface	HTML,CSS,JavaScript
2	ApplicationLogic-1	Python-Flask
3	ApplicationLogic-2	IBMWatsonSTTservice
4	Machinelearning	Regression,RandomForest



5.2USERSTORIES

UserType	Functional Requirement (Epic)	User StoryNumber	UserStory/Task	Acceptance criteria	Priority	Release
Customer (user)	Visitthewebsite	USN-1	Asauser,icanvisitthehomepageofthewebsite andgettoknowabout the website.	Icanaccessthewebsitebycorrect URL.	High	Sprint-1
	Enterthe condition	USN-2	Usercanenterthecarconditions.	Usercanableto enterth e details	High	Sprint-1
	Predictthevalue ofmyoldcar	USN-3	Asauser,IcanpredicttheresaleValue ofthecarbygivingitsdetails/Features .	Icanentercardetails	High	Sprint-2
	Lookforapriceofaused car	USN-4	Asauserandalsoabuyeror Seeker,Icanalsogettoknowthe Priceof theusedcar.	I canchoose mostlikely car.	Medium	Sprint-3
Administrator	Application	USN-5	As anadministratorIcanupgrade/update /modifytheapplicationwithadditionalfeat ures.		Medium	Sprint-4

CHAPTER-6PROJECTPLANNING&SCHEDULING

6.1 SPRINTPLANNING&ESTIMATION

Sprintplanningisaneventinscrumthatkicksoffthesprint.Thepurposeofsprintplanningistodefinewhatcanbedeliveredinthesprintandhowthatworkwillbeachieved.Sprintplanningisdoneincollaborationwiththewholescrumteam.Inscrum,thesprintisasetperiodoftimewhereallthe workisdone.However,beforeyoucanleapintoactionyouhaveto setupthesprint.Youneedtodecideonhowlongthetimeboxisgoingtobe,thesprintgoal,andwhereyou'regoingtostartThesprintplanningsessionkicksoffthesprintbysettingtheagendaandfocus.Ifdonecorrectly,italsocreatesanenvironmentwheretheteamismotivated,challenged,andcanbesuccessful.Badsprintplanscanderailtheteambysettingunrealisticexpectations.Thefollowingisthesprintplanningandestimationfortheproject

Sprint	Functional Requirement (Epic)	User Story Number	UserStory/Task	Story Points	Priority	TeamMembers
Sprint-1	Pre-processdata	USN-1	Collectdataset	5	Medium	KrithikaSreeT MarcusDuraira j
Sprint-1	Pre-processdata	USN-2	ImportrequiredlibrariesReadandcleandataset	10	High	KrithikaSreeT MarcusDuraira j
Sprint-2	ModelBuilding	USN-3	SelectingtheappropriateModel	10	High	MalavikaT SaisathiyaR
Sprint-2	ModelBuilding	USN-4	Evaluatingthemetricsandsavingthe Model	10	Medium	MalavikaT SaisathiyaR
Sprint-3	Application Building	USN-5	BuildingPython Flaskapplication andHTMLFile	20	High	KrithikaSreeT MarcusDurairaj MalavikaTSaisathiyaR

Sprint-4	Trainingthe ModelinIBM	USN-6	TrainingtheModelinIBM IntegrateFlaskwithScoringEndPointinCloud	20	High	KrithikaSreeT MarcusDurairaj MalavikaTSaisathiyaR

6.2 SPRINTDELIVERYSCHEDULE

Sincesprintstakeplaceoverafixedperiodoftime,it'scriticaltoavoidwastingtimeduringplanningandd evelopment. And this is precisely where sprint scheduling enters theequation.Incaseyou'reunfamiliar,asprintscheduleisadocumentthatoutlinessprintpla nningfromendtoend.It'soneof thefirststepsintheagilesprintplanningprocess—andsomethingthatrequiresadequateresearch,planning,andcommunication.SprintDeliveryScheduleforthe proposedsolution:

Sprint	**Total Story Points**	**Duration**	**SprintStartDate**	**SprintEndDate (Planned)**	**Story Points Completed**	**SprintRelease Date(Actual)**
Sprint-1	20	6Days	24Oct2022	29Oct2022	20	26Oct2022
Sprint-2	15	6Days	31Oct2022	05Nov2022	15	01Nov2022
Sprint-3	20	6Days	07Nov 2022	12Nov2022	20	07Nov2022
Sprint-4	20	6Days	14Nov 2022	19Nov2022	20	17Nov2022

CHAPTER-
7CODING&SOLUTIONING

7.1 FEATURE1

DevelopingthemodelandbuildingtheapplicationusingRandomForestRegressionWithgreateraccuracythemodelbuildingwillbepossiblewithbuildingthemodelwithpicklesetupwhichisusedwithlabelencodertogetthedesiredintegerlabelsforthestringinputs.It’sverymucheffectivemethodwillgetbetteraccuracytheline arregressionmethods.

```
importpandasaspdimpo
rtnumpyasnpimportmat
plotlibasplt
from
sklearn.preprocessingimportLabelEncoderimportpickleprint("IMP
ORTEDREQUIREDLIBRARIES")

importos,typesimpo
rtpandasaspd
from
botocore.clientimportConfigi
mportibm_boto3importio
def__iter(self):return0

#@hidden_cell#ThefollowingcodeaccessesafileinyourIBMCloudObjectStorage.Itincludesyourcredentials
.#Youmightwanttoremovethosecredentialsbeforeyousharethenotebook.cos_client=ibm_boto3.client(service_name='s3',
    ibm_api_key_id=' rtM67NclbfmQqWVdp-
    tCviqTbLyYtLCRc3x1VcbQziof',ibm_auth_endpoint="https://iam.cloud.ibm
    .com/oidc/token",config=Config(signature_version='oauth'),endpoint_url='htt
    ps://s3.private.us.cloud-object-storage.appdomain.cloud')

bucket = 'carresalevalueprediction-donotdelete-pr-
yuhtmzidi0ka1p'object_key='autos.csv'

body=cos_client.get_object(Bucket=bucket,Key=object_key)
```

```
df=pd.read_csv((io.BytesIO(body['Body'].read())),header=0,sep=','
,encoding='Latin1',low_memory=False)
df.head()
#df=pd.read_csv("C:/Users/SUGARANJAN/Desktop/IBM/Data/autos.csv",header=0,sep=','
,encoding='Latin1',low_memory=False)
#df.head()
importos,typesimportpandasas
pdfrombotocore.clientimportC
onfigimportibm_boto3importi
o
def__iter(self):return0

#@hidden_cell#ThefollowingcodeaccessesafileinyourIBMCloudObjectStorage.Itincludesy
ourcredentials.#Youmightwanttoremove
thosecredentialsbeforeyousharethenotebook.cos_client=ibm_boto3.client(service_name='s
3',
    ibm_api_key_id='DT15l-
    lL0017uhnUGwXyhG_Eort5gohoW6XJTNoT3RKk',ibm_auth_endpoint="htt
    ps://iam.cloud.ibm.com/oidc/token",config=Config(signature_version='oauth'),
    endpoint_url='https://s3.private.us.cloud-object-storage.appdomain.cloud')

bucket = 'carresalevalueprediction-donotdelete-pr-
yuhtmzidi0ka1p'object_key='autos.csv'

body=cos_client.get_object(Bucket=bucket,Key=object_key)df=pd.read_csv((io.BytesIO(body['Body'].r
ead())),header=0,sep=','
,encoding='Latin1',low_memory=False)
df.head()print(df.seller.value_counts())
df[df.seller
!='gewerblich']df=df.drop('seller',axis=1
)

print(df.offerType.value_counts())df[df.
offerType
```

```
!='Gesuch']df=df.drop('offerType',axis=
1)
```

```
print(df.shape)df=df[(df.powerPS>
50)&(df.powerPS<900)]print(df.sh
ape)
df=df[(df.yearOfRegistration>=1950)&(df.yearOfRegistration<2022)]print(df.sh
ape)
df.drop(['name','abtest','dateCrawled','nrOfPictures','lastSeen','postalCode','dateCreated'],axis='columns',i
nplace=True)new_df=df.copy()new_df=new_df.drop_duplicates(['price','vehicleType','yearOfRegistratio
n','gearbox','powerPS','model','kilometer','monthOfRegistration','fuelType','notRepairedDamage'])new_df.
gearbox.replace(('manuell','automatik'),('manual','automatic'),inplace=True)new_df.fuelType.replace(('be
nzin','andere','elektro'),('petrol','others','electric'),inplace=True)new_df.vehicleType.replace(('kleinwagen',
'cabrio','kombi','andere'),('samllcar','convertible','combination','others'),inplace=True)new_df.notRepaire
dDamage.replace(('ja','nein'),('Yes','No'),inplace=True)new_df=new_df[(new_df.price>=100)&(new_df.
price<=150000)]

new_df['notRepairedDamage'].fillna(value='not-
declared',inplace=True)new_df['fuelType'].fillna(value='not-
declared',inplace=True)new_df['gearbox'].fillna(value='not-
declared',inplace=True)new_df['vehicleType'].fillna(value='not-
declared',inplace=True)new_df['model'].fillna(value='not-
declared',inplace=True)fromibm_watson_machine_learningim
portAPIClientwml_credentials={
   "url":"https://us-
   south.ml.cloud.ibm.com","apikey":"GUHVuufHi0YvdaXTEnAsHFze4ydIPqCFuqypA
   nHL21C8"
}
client=APIClient(wml_credentials)defguide_from_space_name(clie
nt,
   space_name):space=client.spaces.get_details()
#    print(space)
   return(next(item for item
inspace['resources']ifitem['entity']["name"]==space_name)['metadata']['id'
])space_uid=guide_from_space_name(client,'CAR')print("Spac
eUID"+space_uid)client.set.default_space(space_uid)client
.software_specifications.list()
```

```
software_spec_uid = client.software_specifications.get_uid_by_name("runtime-22.1-
py3.9")software_spec_uidprint(new_df)labels=['gearbox','notRepairedDamage','mod
el','brand','fuelType','vehicleType']

mapper={}fo
riinlabels:
    mapper[i]=LabelEncoder()mapper[i].fit(new_df[i
    ])tr=mapper[i].transform(new_df[i])np.save(str('classes'+i+'.npy'),mapper[i].classes_)
    print(i,":",mapper[i])new_df.loc[:,i+'_labels']=pd.Series(tr,index=new_df.index)

labeled
=new_df[['price','yearOfRegistration','powerPS','kilometer','monthOfRegistration']+[x+"_labels"for
xinlabels]]
print(labeled.columns)Y=l
abeled.iloc[:,0].valuesX=l
abeled.iloc[:,1:].values

Y=Y.reshape(-
1,1)fromsklearn.model_selectionimportcross_val_score,train_test_s
plitX_train,X_test,Y_train,Y_test=
train_test_split(X,Y,test_size=0.3,random_state=3)fromsklearn.ensembleimportRandomForestRe
gressorfromsklearn.metricsimportr2_scoreregressor=RandomForestRegressor(n_estimators=1000
,max_depth=10,random_state=34)

regressor.fit(X_train,np.ravel(Y_train,order='C'))y
_pred=regressor.predict(X_test)print(r2_score(Y_t
est,y_pred))filename='resale_model.sav'pickle.du
mp(regressor,open(filename,'wb'))
model_details
    =client.repository.store_model(model=regressor,meta_props={client.repository.M
    odelMetaNames.NAME:"resale_model",client.repository.ModelMetaNames.SOF
    TWARE_SPEC_UID:software_spec_uid,client.repository.ModelMetaNames.TY
    PE:"scikit-learn_1.0"
```

```
})
model_id=client.repository.get_model_id(model_details)model_idX
_train[0]regressor.predict([[2012.0,179.0,'1500000',12.0,0,0,30,1,1
,4]])
```

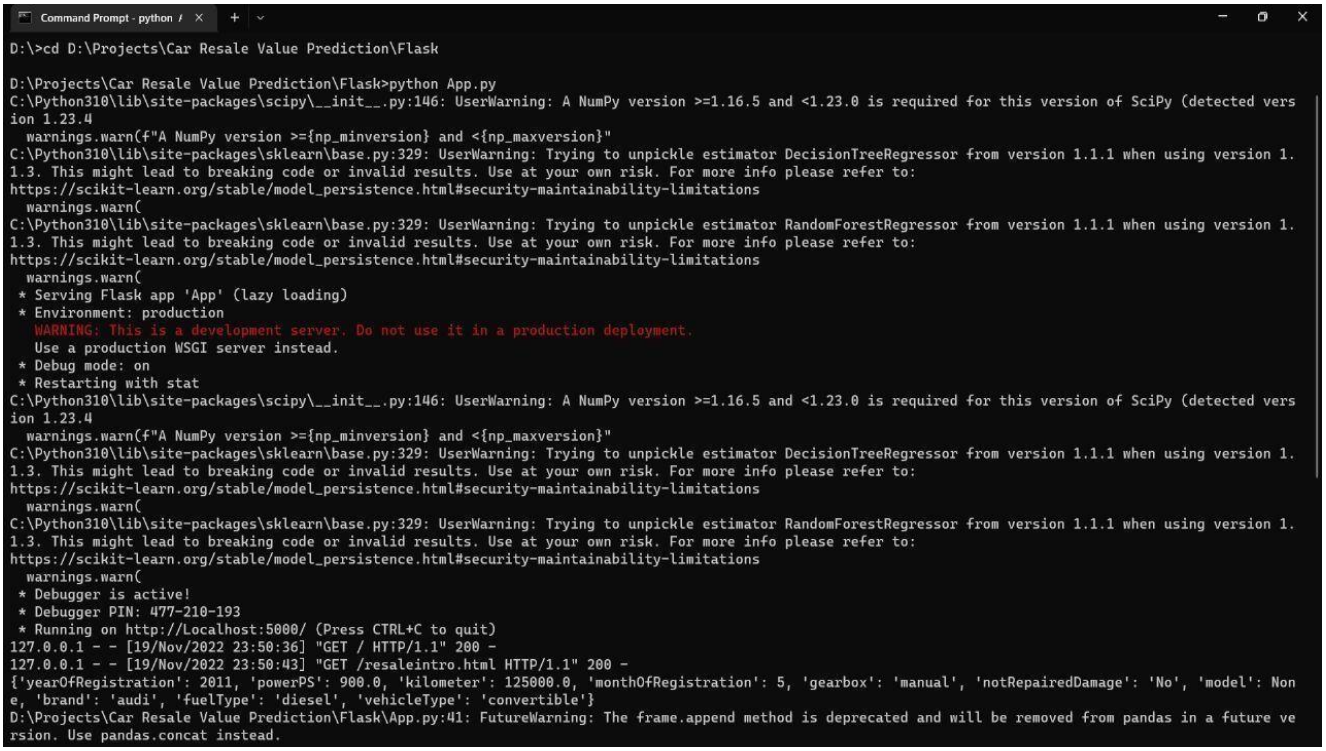
Here we have implemented the pandas and numpy packages to read the input files as welltogettheloadanddumpfilesinthepicklepackage.HerewehavebuiltthemodelwithIBMWatsonbecausew e can't use always the application in offline we need a online source that every usercan usetheprediction methods. Where IBM cloud will deploy the application and we can get better userresultsofpriceofusedcar.

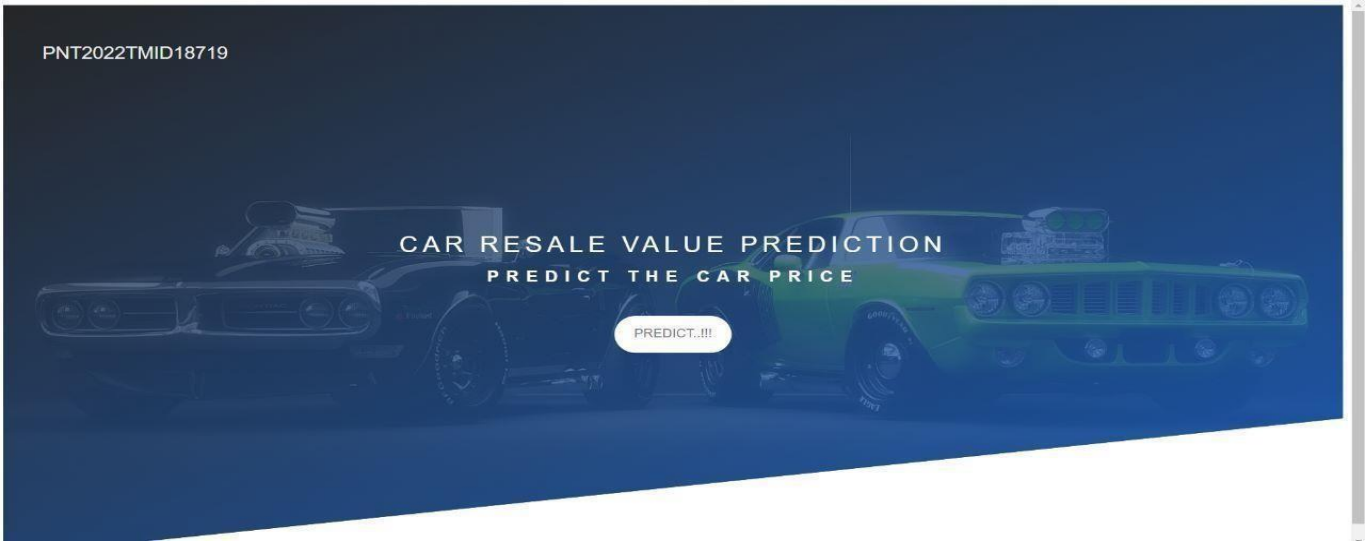
7.2 FEATURE2

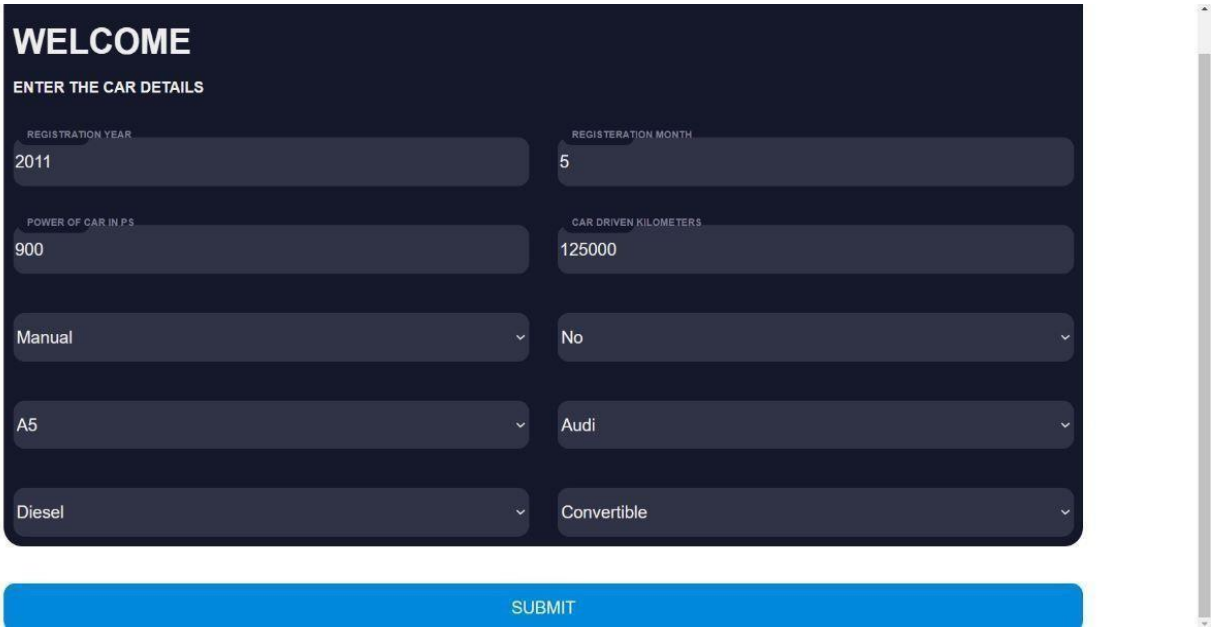
Alwaystheusercan'tcometotheCodingpartandcomestogettheresultsbecausetheuserdon'tknowabo utthecodingapplicationssotheUserbuildsneedinteractivewebsitewhichusercaneasilycatchtheresultsbyjust enteringthecarfunctionalitiesandjustthedetailsofcar.

```
import
pandasaspdimportn
umpyasnp
fromflaskimportFlask,render_template,Response,requestimportpickl
e
from
sklearn.preprocessingimportLabelEncoderimportpickle

app=Flask(name _
,template_folder='../IBM')filename='resale
_model.sav'model_rand=pickle.load(open(file
name,'rb'))

@app.route('/')
defindex():
    returnrender_template('index.html')

@app.route('/resaleintro.html')
defp():
    returnrender_template('resaleintro.html')

@app.route('/predict')
defpredict():
    returnrender_template('resalepredict.html')

@app.route('/y_predict',methods=['GET','POST'])defy_pred
ict():
    regyear
    =int(request.form['regyear'])powerps=float(reque
    st.form['powerps'])
```

```
        kms=float(request.form['kms'])
        regmonth=
        int(request.form.get('regmonth'))gearbox=req
        uest.form['gearbox']damage=request.form['dam
        ']
        model
        =request.form.get('model_type')brand
        =request.form.get('brand')fuelType=request.form.ge
        t('fuel')vehicletype=request.form.get('vehicletype
        ')new_row=
    {'yearOfRegistration':regyear,'powerPS':powerps,'kilometer':kms,'monthOfRegistr
    ation':regmonth,'gearbox':gearbox,'notRepairedDamage':damage,'model':model,'bra
    nd':brand,'fuelType':fuelType,'vehicleType':vehicletype}

        print(new_row)
        new_df=
    pd.DataFrame(columns=['vehicleType','yearOfRegistration','gearbox','powerPS','model','ki
    lometer','monthOfRegistration','fuelType','brand','notRepairedDamage']
    )
        new_df
        =new_df.append(new_row,ignore_index=True)labels=['gearbox','notRepairedDam
    age','model','brand','fuelType','vehicleType']mapper={
        }
        foriinlabels:
            mapper[i]=LabelEncoder()mapper[i]
            .classes_=np.load(str('classes'+i+'.npy'),allow_pickle=True)tr=mapper[i].fit_tr
            ansform(new_df[i])
            new_df.loc[:,i+'_Labels']
        =pd.Series(tr,index=new_df.index)labeled=new_df[['yearOfRegistration'
    ,'powerPS','kilometer','monthOfRegistration']
    +[x+"_Labels"forxinlabels]]

        X=
        labeled.valuesprin
        t(X)
        y_prediction
        =model_rand.predict(X)print(y_predict
        ion)
        returnrender_template('resalepredict.html',ypred="{:.2f}".format(y_prediction[0]
    ))

    ifname=='    _     _
        main':app.run(host='Localhost',debug=True,threaded=False
        )
```


Command Prompt - python /
D:\>cd D:\Projects\Car Resale Value Prediction\Flask
D:\Projects\Car Resale Value Prediction\Flask>python App.py
C:\Python310\lib\site-packages\scipy__init__.py:146: UserWarning: A NumPy version >=1.16.5 and <1.23.0 is required for this version of SciPy (detected version 1.23.4
warnings.warn(f"A NumPy version >={np_minversion} and <{np_maxversion}"
C:\Python310\lib\site-packages\sklearn\base.py:329: UserWarning: Trying to unpickle estimator DecisionTreeRegressor from version 1.1.1 when using version 1.1.3. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:
https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
C:\Python310\lib\site-packages\sklearn\base.py:329: UserWarning: Trying to unpickle estimator RandomForestRegressor from version 1.1.1 when using version 1.1.3. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:
https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
* Serving Flask app 'App' (lazy loading)
* Environment: production
WARNING: This is a development server. Do not use it in a production deployment.
Use a production WSGI server instead.
* Debug mode: on
* Restarting with stat
C:\Python310\lib\site-packages\scipy__init__.py:146: UserWarning: A NumPy version >=1.16.5 and <1.23.0 is required for this version of SciPy (detected version 1.23.4
warnings.warn(f"A NumPy version >={np_minversion} and <{np_maxversion}"
C:\Python310\lib\site-packages\sklearn\base.py:329: UserWarning: Trying to unpickle estimator DecisionTreeRegressor from version 1.1.1 when using version 1.1.3. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:
https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
C:\Python310\lib\site-packages\sklearn\base.py:329: UserWarning: Trying to unpickle estimator RandomForestRegressor from version 1.1.1 when using version 1.1.3. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:
https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
* Debugger is active!
* Debugger PIN: 477-210-193
* Running on http://Localhost:5000/ (Press CTRL+C to quit)
127.0.0.1 - - [19/Nov/2022 23:50:36] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [19/Nov/2022 23:50:43] "GET /resaleintro.html HTTP/1.1" 200 -
{'yearOfRegistration': 2011, 'powerPS': 900.0, 'kilometer': 125000.0, 'monthOfRegistration': 5, 'gearbox': 'manual', 'notRepairedDamage': 'No', 'model': None, 'brand': 'audi', 'fuelType': 'diesel', 'vehicleType': 'convertible'}
D:\Projects\Car Resale Value Prediction\Flask\App.py:41: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.


PNT2022TMID18719
CAR RESALE VALUE PREDICTION
PREDICT THE CAR PRICE
PREDICT..!!!


WELCOME
ENTER THE CAR DETAILS
REGISTRATION YEAR
2011
REGISTERATION MONTH
5
POWER OF CAR IN PS
900
CAR DRIVEN KILOMETERS
125000
Manual
No
A5
Audi
Diesel
Convertible
SUBMIT

CHAPTER -

8TESTING

8.1 TESTCASES

TestcaseID	Feature Type	Component	TestScenario	Pre-Requisite	StepsToExecute
HOME_ PAGE_01	Functional	HomePage	User can SeetheImagesa ndHyper Linksand visits thecalculateBu tton	InternetC onnectivity	1.EnterURLandclickg o 2.SeetheImagesandS tyles 3.Buttontoredirectpage
PREDICTION_ PAGE_01	Functional	Predict	Usercanenterth evaluesastheirc arcondition	Cardetails	1.EnterURL Predictbuttonand clickgo2.Usershoulde nterthedetails 3.VerifyUIelements: a.Textbox b.Valuescrolls c.Selectoptions 3.Usercanclicksubmit
RESULT PAGE	Functional	Result	Usercanabletos ee thecarp rice		OnlytoseethePrice

TestData	ExpectedResult	Actual Result	Status	Commnets	TCfor Automation(Y/N)	ExecutedBy
-	HomepageShould Open	Working asexpect ed	Pass	Improving CSS	N	KrithikaSreeT
vehicleType','y earOfRegistrati on','gearbox','p owerPS','model ','kilometer','m onthOfRegistra tion','fuelType', 'brand','notRep airedDamage'	1. Usercanabletos eetheinputpage. 2. Usercanenterthev alues. 3. Valuesabletoe nter	Working asexpect ed	Pass	Nill	N	Malavika.T
	UsercanseetheCarR esalePrice	Working asexpect ed	Pass	Nill	N	KrithikaSreeT

8.2 USERACCEPTANCETESTING

Resolution	Severity 1	Severity2	Severity3	Severity4	Subtotal
ByDesign	5	5	1	1	12
Duplicate	1	0	0	0	1
External	0	0	0	0	0
Fixed	4	4	1	1	10
NotReproduced	0	0	0	0	0
Skipped	1	1	0	0	2
Won'tFix	0	0	0	0	0
Totals	11	10	2	2	25

Section	TotalCases	NotTested	Fail	Pass
PrintEngine	5	0	0	5
ClientApplication	10	0	0	10
Security	2	0	1	1
FinalReportOutput	5	0	0	5
VersionControl	2	0	0	2

CHAPTER-

9RESULTS

Fig:ProjectOutput

9.1 PERFORMANCEMETRICS

S. No.	Parameter	Values	Screenshot
1	Metrics	**RegressionModel:** MAE-,MSE-,RMSE-,R2score- **ClassificationModel:**ConfusionMatrix-,AccurayScore-& ClassificationReport-	{'mae': 1325.112086905962, 'mse': 9577053.62710202, 'rmse': 3094.6815065692977, 'rmsle': 8.03744027403009, 'r2': 0.8661221626879432, 'adj_r2_score': 0.8661152969113608}

2	Tunethe Model	Hyperparameter Tuning - ValidationMethod-	`y_pred = regressor.predict(X_test)`
			`print(r2_score(Y_test,y_pred))`
			0.8310350387286918

CHAPTER-10ADVANTAGES&DISADVANTAGES

ADVANTAGES

- **Usedcarsellers(dealers):**Theyareoneofthebiggesttargetgroupsthatcanbeinterestedinresults of this study. If used car sellers better understand what makes a car desirable,whattheimportant features are for a used car, then they may consider this knowledge and offerabetterservice.

- **Onlinepricingservices:**Therearewebsitesthatoffersanestimatevalueofacar.Theymayhaveagoodpredictionmodel.However,havingasecondmodelmayhelpthemtogiveabetterpredictiontotheirusers. Therefore,themodeldevelopedinthisstudymayhelponlinewebservicesthattellsausedcar'smarketvalue.

- **Individuals:**Therearelotsofindividualswhoareinterestedintheusedcarmarketatsomepointsintheirlifebecausetheywantedtoselltheircarorbuyausedcar.Inthisprocess,it'sabigcornertopaytoomuchorselllessthenit'smarketvalue

- Abletogiveaccurateandacceptablepriceforbothbuyerandseller.
- Haverangeofoptiononbuyingonbudget.
- Helpsinsavingmoneythangivingtobrokerage.

DISADVANTAGES

- Poorcheckingandinvalidinformationaffectthevalueofprediction.
- Carsarelimitedusagevehiclessomepeopleonlycouldaffordthisbasisonknowledge-basedpurchasing.

CHAPTER-
11CONCLUSION

Westartedwithunderstandingtheusecaseofmachinelearninginthe Automotiveindustryandhowmachinelearninghastransformedthedrivingexperience.WebuildaRandomForestRegressionmodeltopredicttheresalevalueofausedcar.Finally,weevaluatedtheperformanceofthemodelusingtheRsquaredscoreandResidualPlot.Wecouldhavealsousedsimplerregressionalgorithmslike LinearRegressionandLassoRegression.Still,weneedtomakesurethereareno outliersinthedatasetbeforeimplementingthem.Pairplotsandscatterplotshelpvisualizetheoutliers.Thenwehaveusedа Flaskapplicationtodisplaythepredictedvaluetotheusersbasedontheircorrespondinginput.Thiscarresalevalueprediction canbeusedbythepublictoestimatetheresalevalueofthecar .Theincreasedpricesofnewcarsandthefinancialincapabilityofthecustomerstobuythem,UsedCarsalesareonaglobalincrease.Therefore,thereisanurgentneedforaUsedCarPricePredictionsystemwhicheffectivelydeterminesthe worthiness ofthecarusing a varietyof features. The proposedsystem willhelptodeterminetheaccuratepriceofusedcarpriceprediction.Thispapercompares3differentalgorithms formachinelearning:LinearRegression,LassoRegressionandRidgeRegression.

CHAPTER - 12FUTURESCOPE

Infuturethismachinelearningmodelmaybindwithvariouswebsitewhichcanproviderealtimedataforpriceprediction.Also,wemayaddlargehistoricaldataofcarpricewhichcanhelptoimproveaccuracyofthemachinelearningmodel.Wecanbuildanandroidappasuserinterfaceforinteractingwithuser.Forbetterperformance,weplantojudiciouslydesigndeeplearningnetworkstructures,useadaptivelearningratesandtrainonclustersofdatarathertha nthewholedataset.

CHAPTER - 13APPENDIX

13.1 SOURCECODE

13.1.1 App.py

```
importpandasaspdi
mportnumpyasnp
fromflaskimportFlask,render_template,Response,requesti
mportpickle
from
sklearn.preprocessingimportLabelEncoderimportp
ickle


app=Flask(name
,template_folder='../IBM')filename='resale_model
.sav'model_rand=pickle.load(open(filename,'rb'))

@app.route('/')
defindex():
    returnrender_template('index.html')

@app.route('/resaleintro.html')defp(
):
    returnrender_template('resaleintro.html')

@app.route('/predict')de
fpredict():
    returnrender_template('resalepredict.html')

@app.route('/y_predict',methods=['GET','POST'])
defy_predict():
    regyear=int(request.form['regyear'])powe
    rps
    =float(request.form['powerps'])kms=float(reques
    t.form['kms'])
    regmonth
    =int(request.form.get('regmonth'))gearbox=requ
    est.form['gearbox']damage=request.form['dam']
    model=request.form.get('model_type'
    )brand
    =request.form.get('brand')fuelType=request.for
    m.get('fuel')vehicletype=request.form.get('vehi
    cletype')new_row=
{'yearOfRegistration':regyear,'powerPS':powerps,'kilometer':kms,'monthOfRegistration':regmont
h,'gearbox':gearbox,'notRepairedDamage':damage,'model':model,'brand':brand,'fuelType':fuelTy
pe,'vehicleType':vehicletype}

    print(new_row)
    new_df=
pd.DataFrame(columns=['vehicleType','yearOfRegistration','gearbox','powerPS','model','kilomet
```

```
er','monthOfRegistration','fuelType','brand','notRepairedDamage'])new_df=new_df.append(new_
    row,ignore_index=True)labels=['gearbox','notRepairedDamage','model','brand','fuelType','vehic
    leType']
```

```
    mapper=
    {}foriinlabels:mapper[i]=Lab
      elEncoder()mapper[i].class
      es_=
      np.load(str('classes'+i+'.npy'),allow_pickle=True)tr=mapper[i].fit_transfor
       m(new_df[i])new_df.loc[:,i+'_Labels']=pd.Series(tr,index=new_df.index)
    labeled=new_df[['yearOfRegistration','powerPS','kilometer','monthOfRegistration']
+[x+"_Labels"forxinlabels]]

    X =
    labeled.valuesprint(X
    )
    y_prediction
    =model_rand.predict(X)print(y_predi
    ction)
    returnrender_template('resalepredict.html',ypred="{:.2f}".format(y_prediction[0]))

if__name
      _____=='main':app.run(host='Localhost',debug=
      True,thread
    ed
    =False)
```

index.html

```
<!DOCTYPEhtml>
<html>

<head>
  <title>CARRESALEVALUEPREDICTION</title>
  <style>
    body{
      font-family:'Lato',sans-
      serif;font-
      weight:400;font-
      size:16px;line-
      height:1.7;col
      or:#eee;
    }

    .header{
      height:
      100vh;background
      -image:
        linear-
          gradient(torightbottom,rgba(45,46,47,
          0.8),
          rgba(30,108,217,0.8)),
        url('https://wallpaperaccess.com/full/20687.jpg');

      background-
      size:cover;backgrou
      nd-
      position:top;position
```

```
:relative;
```

clip-path:polygon(00,100%0,100%75vh,0100%);

```
}

.brand-box
   {position:ab
   solute;top:40
   px;
```

```
    left:40px;
}

.brand{
    font-size:20px;
}

.text-
    box{pos
    ition:
    absolute;top:50%;
    left:50%;
    transform: translate(-50%, -
    50%);text-align:center;
}

.heading-primary
    {color:#fff;
    text-transform:uppercase;

    backface-
    visibility:hidden;margi
    n-bottom:30px;
}

.heading-primary-main
    {display:block;fo
    nt-size:26px;font-
    weight:400;letter-
    spacing:5px;
}

.heading-primary-sub
    {display:block;
    font-
    size:18px;font-
    weight:700;
    letter-spacing:7.4px;
}

.btn:link,
.btn:visited{
    text-
    transform:uppercase;text-
    decoration:none;padding:
    10px20px;display:inline-
    block;border-
    radius:100px;transition:all
    .2s;position:relative;
}

.btn:hover{transform:translat
    eY(-3px);
    box-shadow:010px20pxrgba(0,0,0,0.2);
```

}

```
.btn:active{
```

```
            transform:translateY(-1px);
            box-shadow:05px10pxrgba(0,0,0,0.2);
        }

        .btn-
            white{backgroun
            d-
            color:#fff;color:#
            777;font-
            size:14px;
        }
    </style>
</head>

<body>
    <headerclass="header">
        <divclass="brand-box">
            <spanclass="brand">PNT2022TMID18719</span>
        </div>

        <divclass="text-box">
            <h1class="heading-primary">
                <spanclass="heading-primary-main">CARRESALEVALUEPREDICTION</span>
                <spanclass="heading-primary-sub">PREDICTTHECARPRICE</span>
            </h1>
            <ahref="resaleintro.html"class="btnbtn-whitebtn-animated">Predict..!!</a>
        </div>
    </header>

</body>

</html>
```

resaleintro.html

```
<!DOCTYPEhtml>
<html>

<head>
    <title>CARRESALEVALUEPREDICTION</title>
    <style>
        body{
            align-
            items:center;backgroun
            d-
            color:lime;display:flex;j
            ustify
            -
            content:center;height:a
            uto;
        }

        .form{
            background-
            color:#15172b;bo
```

```
rder-radius:20px;
```

```
box-sizing: border-
box;height:auto;pa
dding:10px;
```

```
    margin-
    top:30px;width:1
    00%
    ;
}

.title{
    color:#eee;
    font-family: sans-
    serif;font-
    size:36px;font-
    weight:600;margin-
    top:20px;
}

.subtitle
    {color:#eee;
    font-family: sans-
    serif;font-
    size:16px;font-
    weight:600;margin-
    top:10px;
}

.input-container
    {height:50px;po
    sition:relative;wi
    dth:100%;
}

.ic1{
    margin-top:40px;
}

.ic2{
    margin-top:30px;
}

.input{
    background-
    color:#303245;bo
    rder-
    radius:12px;borde
    r:0;
    box-sizing: border-
    box;color:#eee;fon
    t-
    size:18px;height:1
    00%;
    outline:0;wi
    dth:100%;
}

.cut{
    background-
```

color:#15172b;bo
rder-

```
radius:10px;
height:20px;l
eft:20px;posi
tion:absolute
;top:-20px;
transform:translateY(0);
```

```
    transition:transfor
    m200ms;width:76p
    x;
}

.cut-short
    {width:50px
    ;
}

.input:focus~.cut,
.input:not(:placeholder-shown)~.cut
    {transform:translateY(8px);
}

.placeholder,
.option
    {color:#65657b;f
    ont-family: sans-
    serif;left:20px;lin
    e-
    height:14px;poin
    ter-
    events:none;position
    :absolute;transform-
    origin:050%;
    transition:transform200ms,c
    olor200ms;top:20px;
}

.input:focus~.placeholder,
.input:not(:placeholder-
    shown)~.placeholder{transform:translateY(-
    30px)translateX(10px)scale(0.75);
}

.input:not(:placeholder-shown)~.placeholder
    {color:#808097;
}

.input:focus~.placeholder
    {color:#dc2f55;
}

.submit{background
    -
    color:#08d;b
    order-
    radius:12px;border:
    0;
    box-sizing: border-
    box;color:#eee;cur
    sor:pointer;font-
    size:18px;height:5
    0px;margin-
```

```
top:38px;text-
align:center;width:
```

```
    100
    %;
}
```

```
.submit:active{
```

```
            background-color:#06b;
        }
    </style>
    <linkrel="stylesheet"href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstr
ap.min.css">
</head>

<body>
    <formaction="/y_predict"method="post">
        <divclass="container">
            <divclass="form">
                <divclass="title">WELCOME</div>
                <divclass="subtitle">ENTERCARDETAILS</div>
                <divclass="row">
                    <divclass="input-containeric1col-sm-6">
                        <input id="regyear" class="input"
type="text"name="regyear"requiredplaceholder=""/>
                        <divclass="cut"></div>
                        <labelfor="regyear"class="placeholder">REGISTRATIONYEAR</label>
                    </div>
                    <divclass="input-containeric1col-sm-6">
                        <inputid="regmonth"
class="input"type="text"name="regmonth"requiredplaceholder=""/>
                        <divclass="cut"></div>
                        <labelfor="regmonth"class="placeholder">REGISTRATIONMONTH</label>
                    </div>

                </div>
                <divclass="row">
                    <divclass="input-containeric1col-sm-6">
                        <inputid="powerps"class="input"type="text"name="powerps"requiredpla
ceholder=""/>
                        <divclass="cut"></div>
                        <labelfor="powerps"class="placeholder">POWEROFCARINPS</label>
                    </div>
                    <divclass="input-containeric1col-sm-6">
                        <inputid="kms"class="input"type="text"name="kms"requiredplaceholder="
"/>
                        <divclass="cut"></div>
                         <labelfor="kms"class="placeholder">CARDRIVENKILOMETERS</label>
                    </div>
                </div>
                <divclass="row">
                    <divclass="input-containeric1col-sm-6">
                          <selectid="gearbox"class="input"name="gearbox"required>
                              <optionselecteddisabled>GEARBOXTYPE</option>
                           <optionvalue="manual">Manual</option>
                           <optionvalue="automatic">Automatic</option>
                           <optionvalue="not-declared">Not-Declared</option>
                        </select>
                    </div>
                    <divclass="input-containeric1col-sm-6">
                        <selectid="dam"class="input"name="dam"required>
                            <optionselecteddisabled>CARISDAMAGEDORREPAIRED</option>
```

```
                    <optionvalue="No">No</option>
                    <optionvalue="Yes">Yes</option>
                    <optionvalue="not-declared">Not-Declared</option>
                </select>
            </div>
        </div>
        <divclass="row">
            <divclass="input-containeric1col-sm-6">
                <selectid="modeltype"class="input"name="modeltype"required>
                    <optionselecteddisabled>MODELTYPE</option>
                    <optionvalue="80">80</option>
                    <optionvalue="90">90</option>
                    <optionvalue="100">100</option>
                    <optionvalue="145">145</option>
                    <optionvalue="147">147</option>
                    <optionvalue="156">156</option>
                    <optionvalue="159">159</option>
                    <optionvalue="200">200</option>
                    <optionvalue="500">500</option>
                    <optionvalue="850">850</option>
                    <optionvalue="900">900</option>
                    <optionvalue="911">911</option>
                    <optionvalue="9000">9000</option>
                    <optionvalue="1_reihe">1_Reihe</option>
                    <optionvalue="1er">1Er</option>
                    <optionvalue="2_reihe">2_Reihe</option>
                    <optionvalue="3_reihe">3_Reihe</option>
                    <optionvalue="300c">300C</option>
                    <optionvalue="3er">3Er</option>
                    <optionvalue="4_reihe">4_Reihe</option>
                    <optionvalue="5_reihe">5_Reihe</option>
                    <optionvalue="5er">5Er</option>
                    <optionvalue="6_reihe">6_Reihe</option>
                    <optionvalue="6er">6Er</option>
                    <optionvalue="7er">7Er</option>
                    <optionvalue="a_klasse">A_Klasse</option>
                    <optionvalue="a1">A1</option>
                    <optionvalue="a2">A2</option>
                    <optionvalue="a3">A3</option>
                    <optionvalue="a4">A4</option>
                    <optionvalue="a5">A5</option>
                    <optionvalue="a6">A6</option>
                    <optionvalue="a8">A8</option>
                    <optionvalue="accord">Accord</option>
                    <optionvalue="agila">Agila</option>
                    <optionvalue="alhambra">Alhambra</option>
                    <optionvalue="almera">Almera</option>
                    <optionvalue="altea">Altea</option>
                    <optionvalue="amarok">Amarok</option>
                    <optionvalue="andere">Andere</option>
                    <optionvalue="antara">Antara</option>
                    <optionvalue="arosa">Arosa</option>
                    <optionvalue="astra">Astra</option>
                    <optionvalue="auris">Auris</option>
```

<option value="avensis">Avensis</option>
<option value="aveo">Aveo</option>
<option value="aygo">Aygo</option>
<option value="b_klasse">B_Klasse</option>
<option value="b_max">B_Max</option>
<option value="beetle">Beetle</option>
<option value="berlingo">Berlingo</option>
<option value="bora">Bora</option>
<option value="boxster">Boxster</option>
<option value="bravo">Bravo</option>
<option value="c_klasse">C_Klasse</option>
<option value="c_max">C_Max</option>
<option value="c_reihe">C_Reihe</option>
<option value="c1">C1</option>
<option value="c2">C2</option>
<option value="c3">C3</option>
<option value="c4">C4</option>
<option value="c5">C5</option>
<option value="caddy">Caddy</option>
<option value="calibra">Calibra</option>
<option value="captiva">Captiva</option>
<option value="carisma">Carisma</option>
<option value="carnival">Carnival</option>
<option value="cayenne">Cayenne</option>
<option value="cc">Cc</option>
<option value="ceed">Ceed</option>
<option value="charade">Charade</option>
<option value="cherokee">Cherokee</option>
<option value="citigo">Citigo</option>
<option value="civic">Civic</option>
<option value="cl">Cl</option>
<option value="clio">Clio</option>
<option value="clk">Clk</option>
<option value="clubman">Clubman</option>
<option value="colt">Colt</option>
<option value="combo">Combo</option>
<option value="cooper">Cooper</option>
<option value="cordoba">Cordoba</option>
<option value="corolla">Corolla</option>
<option value="corsa">Corsa</option>
<option value="cr_reihe">Cr_Reihe</option>
<option value="croma">Croma</option>
<option value="crossfire">Crossfire</option>
<option value="cuore">Cuore</option>
<option value="cx_reihe">Cx_Reihe</option>
<option value="defender">Defender</option>
<option value="delta">Delta</option>
<option value="discovery">Discovery</option>
<option value="discovery_sport">Discovery_Sport</option>
<option value="doblo">Doblo</option>
<option value="ducato">Ducato</option>
<option value="duster">Duster</option>
<option value="e_klasse">E_Klasse</option>
<option value="elefantino">Elefantino</option>

<option value="eos">Eos</option>
<option value="escort">Escort</option>
<option value="espace">Espace</option>
<option value="exeo">Exeo</option>
<option value="fabia">Fabia</option>
<option value="fiesta">Fiesta</option>
<option value="focus">Focus</option>
<option value="forester">Forester</option>
<option value="forfour">Forfour</option>
<option value="fortwo">Fortwo</option>
<option value="fox">Fox</option>
<option value="freelander">Freelander</option>
<option value="fusion">Fusion</option>
<option value="g_klasse">G_Klasse</option>
<option value="galant">Galant</option>
<option value="galaxy">Galaxy</option>
<option value="getz">Getz</option>
<option value="gl">Gl</option>
<option value="glk">Glk</option>
<option value="golf">Golf</option>
<option value="grand">Grand</option>
<option value="i_reihe">I_Reihe</option>
<option value="i3">I3</option>
<option value="ibiza">Ibiza</option>
<option value="impreza">Impreza</option>
<option value="insignia">Insignia</option>
<option value="jazz">Jazz</option>
<option value="jetta">Jetta</option>
<option value="jimny">Jimny</option>
<option value="juke">Juke</option>
<option value="justy">Justy</option>
<option value="ka">Ka</option>
<option value="kadett">Kadett</option>
<option value="kaefer">Kaefer</option>
<option value="kalina">Kalina</option>
<option value="kalos">Kalos</option>
<option value="kangoo">Kangoo</option>
<option value="kappa">Kappa</option>
<option value="kuga">Kuga</option>
<option value="laguna">Laguna</option>
<option value="lancer">Lancer</option>
<option value="lanos">Lanos</option>
<option value="legacy">Legacy</option>
<option value="leon">Leon</option>
<option value="lodgy">Lodgy</option>
<option value="logan">Logan</option>
<option value="lupo">Lupo</option>
<option value="lybra">Lybra</option>
<option value="m_klasse">M_Klasse</option>
<option value="m_reihe">M_Reihe</option>
<option value="materia">Materia</option>
<option value="matiz">Matiz</option>
<option value="megane">Megane</option>
<option value="meriva">Meriva</option>

<option value="micra">Micra</option>
<option value="mii">Mii</option>
<option value="modus">Modus</option>
<option value="mondeo">Mondeo</option>
<option value="move">Move</option>
<option value="musa">Musa</option>
<option value="mustang">Mustang</option>
<option value="mx_reihe">Mx_Reihe</option>
<option value="navara">Navara</option>
<option value="niva">Niva</option>
<option value="not-declared">Not-Declared</option>
<option value="note">Note</option>
<option value="nubira">Nubira</option>
<option value="octavia">Octavia</option>
<option value="omega">Omega</option>
<option value="one">One</option>
<option value="outlander">Outlander</option>
<option value="pajero">Pajero</option>
<option value="panda">Panda</option>
<option value="passat">Passat</option>
<option value="phaeton">Phaeton</option>
<option value="picanto">Picanto</option>
<option value="polo">Polo</option>
<option value="primera">Primera</option>
<option value="ptcruiser">Ptcruiser</option>
<option value="punto">Punto</option>
<option value="q3">Q3</option>
<option value="q5">Q5</option>
<option value="q7">Q7</option>
<option value="qashqai">Qashqai</option>
<option value="r19">R19</option>
<option value="range_rover">Range_Rover</option>
<option value="range_rover_evoque">Range_Rover_Evoque</option>
<option value="range_rover_sport">Range_Rover_Sport</option>
<option value="rangerover">Rangerover</option>
<option value="rav">Rav</option>
<option value="rio">Rio</option>
<option value="roadster">Roadster</option>
<option value="roomster">Roomster</option>
<option value="rx_reihe">Rx_Reihe</option>
<option value="s_klasse">S_Klasse</option>
<option value="s_max">S_Max</option>
<option value="s_type">S_Type</option>
<option value="s60">S60</option>
<option value="samara">Samara</option>
<option value="sandero">Sandero</option>
<option value="santa">Santa</option>
<option value="scenic">Scenic</option>
<option value="scirocco">Scirocco</option>
<option value="seicento">Seicento</option>
<option value="serie_2">Serie_2</option>
<option value="serie_3">Serie_3</option>
<option value="sharan">Sharan</option>
<option value="signum">Signum</option>

```
                <optionvalue="sirion">Sirion</option>
                <optionvalue="sl">Sl</option>
                <optionvalue="slk">Slk</option>
                <optionvalue="sorento">Sorento</option>
                <optionvalue="spark">Spark</option>
                <optionvalue="spider">Spider</option>
                <optionvalue="sportage">Sportage</option>
                <optionvalue="sprinter">Sprinter</option>
                <optionvalue="stilo">Stilo</option>
                <optionvalue="superb">Superb</option>
                <optionvalue="swift">Swift</option>
                <optionvalue="terios">Terios</option>
                <optionvalue="tigra">Tigra</option>
                <optionvalue="tiguan">Tiguan</option>
                <optionvalue="toledo">Toledo</option>
                <optionvalue="touareg">Touareg</option>
                <optionvalue="touran">Touran</option>
                <optionvalue="transit">Transit</option>
                <optionvalue="transporter">Transporter</option>
                <optionvalue="tt">Tt</option>
                <optionvalue="tucson">Tucson</option>
                <optionvalue="twingo">Twingo</option>
                <optionvalue="up">Up</option>
                <optionvalue="v_klasse">V_Klasse</option>
                <optionvalue="v40">V40</option>
                <optionvalue="v50">V50</option>
                <optionvalue="v60">V60</option>
                <optionvalue="v70">V70</option>
                <optionvalue="vectra">Vectra</option>
                <optionvalue="verso">Verso</option>
                <optionvalue="viano">Viano</option>
                <optionvalue="vito">Vito</option>
                <optionvalue="vivaro">Vivaro</option>
                <optionvalue="voyager">Voyager</option>
                <optionvalue="wrangler">Wrangler</option>
                <optionvalue="x_reihe">X_Reihe</option>
                <optionvalue="x_trail">X_Trail</option>
                <optionvalue="x_type">X_Type</option>
                <optionvalue="xc_reihe">Xc_Reihe</option>
                <optionvalue="yaris">Yaris</option>
                <optionvalue="yeti">Yeti</option>
                <optionvalue="ypsilon">Ypsilon</option>
                <optionvalue="z_reihe">Z_Reihe</option>
                <optionvalue="zafira">Zafira</option>

            </select>
        </div>
        <divclass="input-containeric1col-sm-6">
            <selectid="brand"class="input"name="brand"required>
                <optionselecteddisabled>CARBRAN</option>
                <optionvalue="audi">Audi</option>
                <optionvalue="alfa_romeo">Alfa_Romeo</option>
                <optionvalue="fiat">Fiat</option>
                <optionvalue="volvo">Volvo</option>
```

```
                <optionvalue="saab">Saab</option>
                <optionvalue="porsche">Porsche</option>
                <optionvalue="mazda">Mazda</option>
                <optionvalue="peugeot">Peugeot</option>
                <optionvalue="bmw">Bmw</option>
                <optionvalue="chrysler">Chrysler</option>
                <optionvalue="mercedes_benz">Mercedes_Benz</option>
                <optionvalue="honda">Honda</option>
                <optionvalue="opel">Opel</option>
                <optionvalue="seat">Seat</option>
                <optionvalue="nissan">Nissan</option>
                <optionvalue="volkswagen">Volkswagen</option>
                <optionvalue="hyundai">Hyundai</option>
                <optionvalue="mitsubishi">Mitsubishi</option>
                <optionvalue="lancia">Lancia</option>
                <optionvalue="toyota">Toyota</option>
                <optionvalue="renault">Renault</option>
                <optionvalue="chevrolet">Chevrolet</option>
                <optionvalue="suzuki">Suzuki</option>
                <optionvalue="kia">Kia</option>
                <optionvalue="citroen">Citroen</option>
                <optionvalue="ford">Ford</option>
                <optionvalue="jaguar">Jaguar</option>
                <optionvalue="skoda">Skoda</option>
                <optionvalue="rover">Rover</option>
                <optionvalue="smart">Smart</option>
                <optionvalue="mini">Mini</option>
                <optionvalue="lada">Lada</option>
                <optionvalue="daewoo">Daewoo</option>
                <optionvalue="jeep">Jeep</option>
                <optionvalue="daihatsu">Daihatsu</option>
                <optionvalue="subaru">Subaru</option>
                <optionvalue="dacia">Dacia</option>
                <optionvalue="land_rover">Land_Rover</option>
                <optionvalue="trabant">Trabant</option>
                <optionvalue="sonstige_autos">Sonstige_Autos</option>
            </select>
        </div>
    </div>
    <divclass="row">
        <divclass="input-containeric1col-sm-6">
            <selectid="fuel"class="input"name="fuel"required>
                <optionselecteddisabled>FUELTYPE</option>
                <optionvalue="petrol">Petrol</option>
                <optionvalue="diesel">Diesel</option>
                <optionvalue="lpg">Lpg</option>
                <optionvalue="hybrid">Hybrid</option>
                <optionvalue="cng">Cng</option>
                <optionvalue="electric">Electric</option>
                <optionvalue="not-declared">Not-Declared</option>
                <optionvalue="others">Others</option>
            </select>
        </div>
        <divclass="input-containeric1col-sm-6">
```

```
                    <selectid="vehicletype"class="input"name="vehicletype"required>
                      <optionselecteddisabled>VEHICLETYPE</option>
                      <optionvalue="convertible">Convertible</option>
                      <optionvalue="limousine">Limousine</option>
                      <optionvalue="combination">Combination</option>
                      <optionvalue="coupe">Coupe</option>
                      <optionvalue="samllcar">SamllCar</option>
                      <optionvalue="bus">Bus</option>
                      <optionvalue="not-declared">Not-Declared</option>
                      <optionvalue="others">Others</option>
                    </select>
                  </div>
                </div>

              </div>
              <buttontype="text"class="submit">SUBMIT</button>
            </div>
            </div>
          </form>
        </body>

        </html>
```

resalepredict.html

```
        <!DOCTYPEhtml>
        <html>

        <head>
          <title>CARRESALEVALUEPREDICTION</title>
          <style>
            body{
              font-family:Avenir,Helvetica;
            }

            h1{
              text-
              align:cente
              r;font-
              size:4.5em;
            }

            h2{
              text-
              align:center
              ;font-
              size:2em;fo
              nt-
              weight:nor
              mal;font-
              style:italic;
            }

            h3{
              font-
```

size:2em;fo

```
nt-
weight:bold;
margin:3%20%1%20%;
```

}

```
h4{
    font-
    size:1.5em;f
    ont-
    weight:bold;
    margin:3%20%1%20%;
}

p{
    font-
    size:1.2em;margin:1%
    20%
    ;
}

li{
    font-
    size:1.2em;font-
    weight:bold;mar
    gin:1%20%;
}

footer{
    font-
    family:Avenir,Helveti
    ca;text-
    align:center;font-
    size:0.8em;margin:02
    0%;
}

figure{
    width:50%;displa
    y:block;margin-
    left:auto;margin-
    right:auto;margin-
    top:2%;
    margin-
    bottom:2%;backgroun
    d-color:white;border-
    width:5px;border-
    style:solid;border-
    color:White;
}

.img-block
    {display:bloc
    k;width:100
    %;
}

figcaption{te
    xt-
    align:right;
    font-
    size:0.8em;
```

}

```
.block{
    width:
    90%;margin-left:
    auto;margin-right:
    auto;margin-
    top:2%;
    margin-bottom:2%;
    background-color:linear-gradientrgba(76,216,255,0.8);
```

```
        }
    </style>
    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/4.7.0/css/font-awesome.min.css">
</head>

<body>

    <bodystyle="text-align:center;">
        <divclass="block">
            <br>
            <br>
            <h1>THEPREDICTEDRESALEVALUEOFTHECARIS</h1>
            <h2><iclass="fafa-inr"></i>{{ypred}}</h2>
    </body>
</div>
</html>
```

13.2 GITHUB&PROJECTDEMOLINK

13.2.1 GITHUB

https://github.com/IBM-EPBL/IBM-Project-26179-1660020275

13.2.2 PROJECTDEMOLINK

https://drive.google.com/file/d/1S8sH7CSXTbGsjrUO2yYHkNI6BA9nsjxv/view?usp=sharing