Auto-Insurance Prediction System

Group • 4
Section B

Overview

Use Case

Predicting *Yearly Premium* to be paid by customer.

Rule Engine

Java Expert System Shell (JESS)

Expert System Domain

Banking and Financial Sector

Objective

Objective • Predicting Yearly Premium

The Expert System takes into consideration various factors in the insurance industry to predict the premium to be paid by the insured customer every year. These factors include:

- Age of policyholder
- Age of Vehicle
- Whether or not the Policyholder is Alcoholic
- Cost of Vehicle (In lakhs)
- Policyholder’s Driving Skill Score (out of 10)
- Driver's Offence Points

Objective • Predicting Yearly Premium

- Average Distance travelled per day(in km)
- Traffic In Area (‘Low’, ‘Medium’, ‘High’)
- Gender of Policyholder
- Engine Type (Diesel or Petrol)
- Whether or not Security System is Installed
- Marital Status of Policy Holder
- Policyholder’s Driving Experience (In years)
- Size of Car (‘Small’, ‘Medium’, ‘Large’)
- Whether or not Policyholder is a tenant

Factors Affecting Auto Insurance

Location

In highly populated or urban areas, congestion, accidents and insurance claims are more prevalent.
Living and driving in a metro area makes rates higher than that of a rural area, where having an auto accident due to these factors is less likely.

Age

Statistics show that young, novice drivers tend to be immature behind the wheel, are easily distracted and crash more often.Hence, they are the riskiest category of drivers to insure.
The younger the driver the higher the rate is a rule often followed in auto insurance.

Gender

Statistics indicate that males are more likely to crash in the early years of driving when they are known to be more aggressive drivers.

However, around the 30s, gender differences in fatality risk diminish, and both pay similar rates.

Later the rates increase for males again, as they enter their 60s and tend to crash more than females.

Marital Status

Married couples have been found statistically to be less of a risk than their single (including divorced or widowed) counterparts.

They have been found to be less active, and in a sense safer than single drivers, resulting in fewer accidents and claims.

Thus leading to lesser rates for married policyholders as compared to single ones.

Vehicle Type

The type of car driving affects the rates since the way in which one drives these types of cars differs.

Additional factors may also be determined from the vehicle's model:

- **Purchase price**
- **Theft rate**
- **Cost of repairs**
- **Accident rate**
- **Safety tests**

Use of Vehicle

The purpose of driving the vehicle is important. A vehicle used to commute to school or work poses more of a risk than the car which is taken out only once in a week. Personal use of a vehicle attracts lesser rates than business use. Since those using their car for business purposes have a higher chance of being in an accident due to increase driving time.

Annual Mileage

The less you drive, the less risk you have of being in an accident.

The risk is predicted on the basis the of the commute of vehicle - whether it is headed to a metropolis or to a rural area.

The surrounding population like a heavily populated metropolitan area puts one at greater risk.

Driving Record

Behavior on the road directly affects the risk and its corresponding rate.

Drivers with a clean driver's history qualify for better rates and may even be eligible for a good/safe driver discount.

Driving Experience

Inexperienced drivers pose more risk. Anyone who hasn't driven a car is automatically considered as posing a higher risk, no matter what the age.

Teens are the biggest category of inexperienced drivers and also pay the most because their age and inexperience are a double whammy.

A 40-year-old getting a license is considered more mature and conservative than a 16-year old , thus giving him a lower rate.

Claims Record

Along with driving records, claims given to previous insurance companies are also considered.

At-fault claims will likely result in a surcharge, while not-at-fault collisions and comprehensive claims may not.

The number of claims the policyholder has had also matters. If there are three claims in three years, auto insurance providers will consider it as risky to insure .

Methodology

Methodology • Background

- Each of the mentioned factors are of varying severity, and hence affect the claim rate with a different probability.
- E.g., Marital status does not affect the claim probability as much as the geographical location does, and thus carries less weight in the premium.
- Keeping this mind we use assign different weights(in percentages) for different scenarios in each factor.

Methodology • Workflow

i. Input responses are received from the user.

ii. Depending on a set of previously defined rules, weights are assigned to each factor, depending upon their salience.

iii. Weights corresponding to all different factors are averaged.

iv. The average is then used as a base price for generating the yearly premium amount.

Implementation

Implementation • Functions

- **calc_age**:
  Calculates weight depending upon age of policyholder.
- **calc_vehicle_age:**
  Calculates weight depending upon vehicle age (despite of use, from the day it was bought).
- **calc_alcoholic**:
  Calculates weight depending upon whether the policyholder is alcoholic or not.

Implementation • Functions

- **calc_vehicle_cost:**
  Calculates weight depending upon the cost of the vehicle. Higher the price, the lower the risk, as the costly vehicles have better safety measures and durability.

- **calc_driving_skill_score:**
  Calculates weight depending upon driving score of policyholder. The lower the score, more is the risk and higher the tendency of accidents.

Implementation • Functions

- **calc_average_distance:**
  Calculates weight depending upon the average distance covered by policyholder on a daily basis, as it affects the vehicle mileage.
- **calc_traffic:**
  Calculates weight depending upon surrounding area where the vehicle is travelling and headed towards. The metropolis tends to attract a higher risk than rural area.
- **calc_gender:**
  Calculates the weight depending upon the gender of policyholder, as males tend to be more aggressive drivers than females.

Implementation • Functions

- **calc_security_system:**
  Calculates weight depending on whether the vehicle of policyholder has a security system.
- **calc_marital_status:**
  Calculates weight depending upon the marital status of the policyholder, as married couples have been found to be less of a risk than singles.
- **calc_driving_experience:**
  Calculates the weight depending on the driving experience of the policyholder. Inexperienced drivers pose a greater risk.

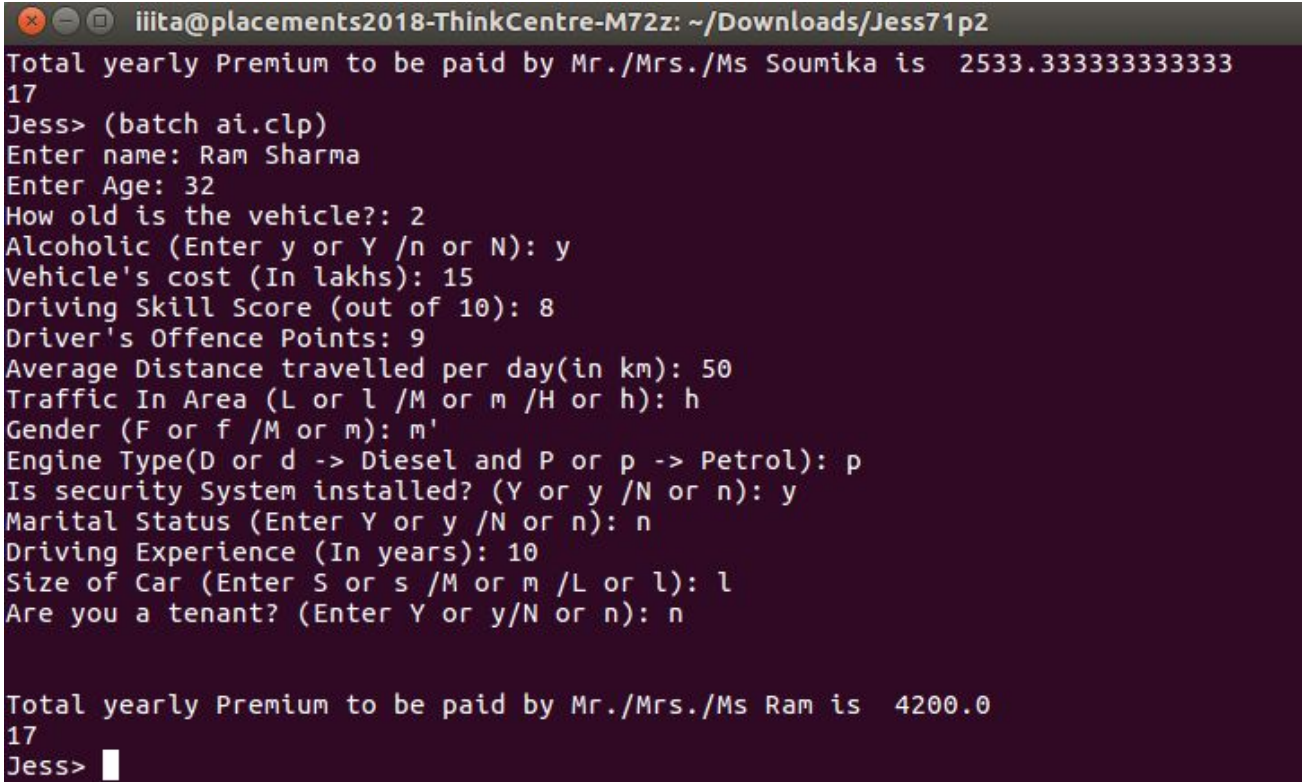
Implementation • Functions

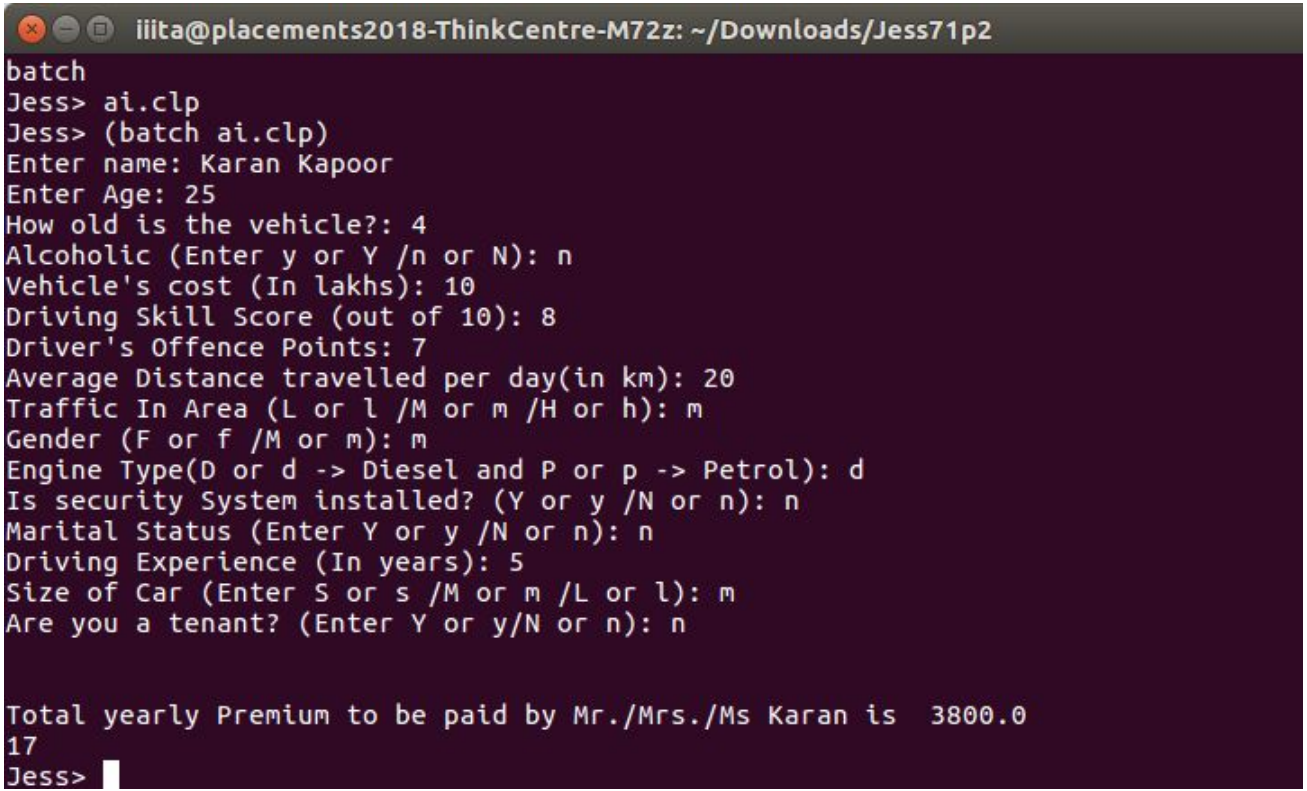
- **calc_size_car:**
  Calculates weight depending on size of vehicle of policyholder.
- **calc_tenant:**
  Calculates weight depending upon whether the policyholder is tenant or not. Tenants usually have better rate .
- **calc_driver_offence_points:**
  Calculates the weight depending upon how offensive the driver is. Lower the offence points, better the rate.
- **prompt:**
  Prompts the user to provide inputs for different factors/

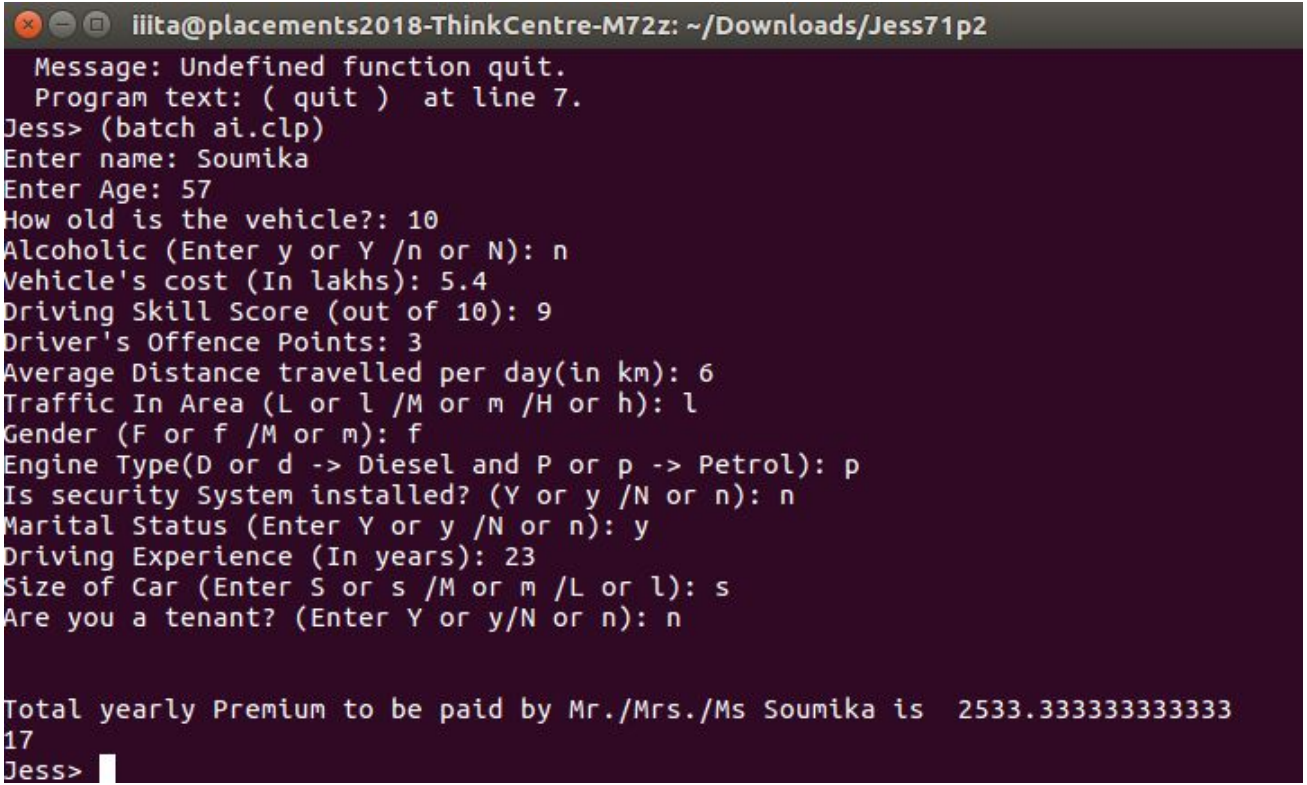
Implementation • Rules

- check_name
- check_age
- check_vehicle_age
- check_alcoholic
- check_vehicle_cost
- check_driving_skill_score
- check_driver_offence_points
- check_tenant
- check_average_distance
- check_traffic
- check_gender
- check_engine_type
- check_security_system
- check_marital_status
- check_driving_experience
- check_size_car

Screenshots


iiita@placements2018-ThinkCentre-M72z: ~/Downloads/Jess71p2
Total yearly Premium to be paid by Mr./Mrs./Ms Soumika is 2533.333333333333
17
Jess> (batch ai.clp)
Enter name: Ram Sharma
Enter Age: 32
How old is the vehicle?: 2
Alcoholic (Enter y or Y /n or N): y
Vehicle's cost (In lakhs): 15
Driving Skill Score (out of 10): 8
Driver's Offence Points: 9
Average Distance travelled per day(in km): 50
Traffic In Area (L or l /M or m /H or h): h
Gender (F or f /M or m): m'
Engine Type(D or d -> Diesel and P or p -> Petrol): p
Is security System installed? (Y or y /N or n): y
Marital Status (Enter Y or y /N or n): n
Driving Experience (In years): 10
Size of Car (Enter S or s /M or m /L or l): l
Are you a tenant? (Enter Y or y/N or n): n
Total yearly Premium to be paid by Mr./Mrs./Ms Ram is 4200.0
17
Jess>


iiita@placements2018-ThinkCentre-M72z: ~/Downloads/Jess71p2
batch
Jess> ai.clp
Jess> (batch ai.clp)
Enter name: Karan Kapoor
Enter Age: 25
How old is the vehicle?: 4
Alcoholic (Enter y or Y /n or N): n
Vehicle's cost (In lakhs): 10
Driving Skill Score (out of 10): 8
Driver's Offence Points: 7
Average Distance travelled per day(in km): 20
Traffic In Area (L or l /M or m /H or h): m
Gender (F or f /M or m): m
Engine Type(D or d -> Diesel and P or p -> Petrol): d
Is security System installed? (Y or y /N or n): n
Marital Status (Enter Y or y /N or n): n
Driving Experience (In years): 5
Size of Car (Enter S or s /M or m /L or l): m
Are you a tenant? (Enter Y or y/N or n): n
Total yearly Premium to be paid by Mr./Mrs./Ms Karan is 3800.0
17
Jess>


iiita@placements2018-ThinkCentre-M72z: ~/Downloads/Jess71p2
Message: Undefined function quit.
Program text: (quit) at line 7.
Jess> (batch ai.clp)
Enter name: Soumika
Enter Age: 57
How old is the vehicle?: 10
Alcoholic (Enter y or Y /n or N): n
Vehicle's cost (In lakhs): 5.4
Driving Skill Score (out of 10): 9
Driver's Offence Points: 3
Average Distance travelled per day(in km): 6
Traffic In Area (L or l /M or m /H or h): l
Gender (F or f /M or m): f
Engine Type(D or d -> Diesel and P or p -> Petrol): p
Is security System installed? (Y or y /N or n): n
Marital Status (Enter Y or y /N or n): y
Driving Experience (In years): 23
Size of Car (Enter S or s /M or m /L or l): s
Are you a tenant? (Enter Y or y/N or n): n
Total yearly Premium to be paid by Mr./Mrs./Ms Soumika is 2533.333333333333
17
Jess>

Thank You

IIT2016099, IIT2016111, IIT2016512, IIT2016515, IIT2016516, IHM2016007, IHM2016501, IRM2016002, ITM2016004, ITM2016006, ITM2016008, IWM2016005, IWM2016501, IWM2016502