UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
SESSION 2020/2021
SEMESTER-II

Course Code: SCSJ3553
Course Name: Artificial Intelligence
Section: 08

Group: Quantae

SUBMITTED TO
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Senior Lecturer

Project Title: Predict House Price (Project Synopsis)

Date of Submission
17th December, 2020

Predict Housing Price

Summary:

House Price Index (HPI) is commonly used to estimate the changes in housing price. Since housing price is strongly correlated to other factors such as location, area, population, it requires other information apart from HPI to predict individual housing price. There has been a considerably large number of papers adopting traditional machine learning approaches to predict housing prices accurately, but they rarely concern about the performance of individual models and neglect the less popular yet complex models. As a result, to explore various impacts of features on prediction methods, this will apply both traditional and advanced machine learning approaches to investigate the difference among several advanced models. There has been a considerably large number of researchers adopting traditional machine learning approaches to predict housing prices accurately, but they rarely concern about the performance of individual models and neglect the less popular yet complex models. As a result, to explore various impacts of features on prediction methods, this will apply both traditional and advanced machine learning approaches to investigate the difference among several advanced models.

Progress 1 - Design Thinking Oriented Proposal
Theme: Predict Housing Price

Submission Date: 20-12-2020

Introduction: In this modern era, we often see that the volatility of estimating housing price is considered as a major concern among both the sellers and buyers. Therefore, an automated system is badly needed which can predict the housing price in a precise manner that will help the people who want to buy a new house keeping the budgets and market strategies in mind. Although there are many factors such as area, location, population and so on which are correlated to the housing price estimation, our proposed system will come up with an ideal solution by analyzing the market and all the other factors to predict the housing price.

AI Solution: When people attempt to buy a house usually face problems regarding the market price, they struggle to predict the housing price because of inadequate knowledge and fewer opportunities to compare. Customers usually get confused whether the property they're attempting to buy is profitable or not in the future. In order to solve this problem, we are going to establish an automated system that aims to predict the efficient housing price with respect to the customers' budgets and priorities. It will predict the future prices by analyzing previous market trends and price ranges. This system will help the customers to invest their money without approaching any broker which will ensure a hassle free experience to the customers and a safe investment.

Goal of AI Solution:

- For each home, estimate the selling price.
- To analyse price range.
- Future prices are predicted for future developments.

Process of Empathize in Design Thinking:

I want something convenient.

I want the location to be close to my work/business place with nice roads & least amount of traffic.

I want the area to be peaceful with least crime rate possible

Is the information legit?

Will this house be beneficial for me?

Is the area safe & sound?

Don't want to go above my budget.

SAYS
DOES

THINKS
FEELS

Google

List down the pros & cons.

Explore the neighborhood.

Excited

Comfortable

Anxious

Cautious

Design Thinking

Design Thinking is a design process providing a solution-based approach to solving problems. It is very useful for tackling complex problems that are not properly defined or unknown. It is done by understanding the human needs involved, by reframing the problem in human-centric ways, by creating many ideas from brainstorming sessions, and by adopting a hands-on approach in prototyping and testing.

There are 5 stages of this design thinking. Understanding these five stages of Design Thinking will empower anyone to apply the Design Thinking methods for solving complex problems that occur around us in our companies, in our countries, and even on the scale of our planet.

We will focus on the five-stage Design Thinking model proposed by the Hasso-Plattner Institute of Design at Stanford (d.school). d.school is the leading university when it comes to teaching Design Thinking. The five stages of Design Thinking, according to d.school, are as follows: **Empathise, Define (the problem), Ideate, Prototype, and Test**.

Process of Define in Design Thinking:

Users	Needs	Insights
-A person who is looking forward to buy a house on a reasonable price	-To find out about all the costings & materials used for a particular house. -To get the estimated reasonable price for that particular house. -To find out about the location and the surrounding safety concerns of a house. -To find out the desired space & sized house. -To find out the distance of malls, patrol stations etc. from the located house.	-The user would like to know about the details of costings & materials used inside. -The user would like to know the quality of the materials used for making the house. - The user would like to know about the availability of necessities from their house. E.g. – malls, fuel pump etc. -The user would like to know about the norms & culture for the area of the house. -The user would like the location of the house to be near their respective workplace with smooth journeys.

Conclusion: To conclude, in this real world, it's getting difficult to store a huge number of data and it's really hard to get particular data in a traditional way from the ocean of data. That's why we need the help of AI and ML to use the data in a more efficient way. Our system will generate all the information and organize the data in a convenient way analyzing all the factors related to housing price in order to predict the housing price with the help of AI and ML to make the investment more secure and fruitful for the customers.

Progress 2 – Knowledge Representation
Theme: Predict Housing Price

Submission Date: 26-12-2020

1. IF location=choose AND Population=count AND Per_Captia = select), Then the switch=ON.

When the location is choose, population is count and per_Captia is select then the switch is activated or on

(Choose(location) ^ count(Population))^ select(Per_Captia) ->ON(switch)

Location	Population	Per_captia	Switch	Location^Population	(Location^Population)^ Per_Captia	((Location^Population)^Per_Captia)->switch
T	T	T	T	T	T	T
T	T	T	F	T	T	F
T	T	F	T	T	F	T
T	T	F	F	T	F	T
T	F	T	T	F	F	T
T	F	T	F	F	F	T
T	F	F	T	F	F	T
T	F	F	F	F	F	T
F	T	T	T	F	F	T
F	T	T	F	F	F	T
F	T	F	T	F	F	T
F	T	F	F	F	F	T
F	F	T	T	F	F	T
F	F	T	F	F	F	T
F	F	F	T	F	F	T
F	F	F	F	F	F	T

2. If(House_area =calculate, then price=SET)

When the House_area is calculate, then the system start to Set the price .

Calculate(House_area)->set(Price)

House_area	Price	Calculate(House_area)->set(Price)
T	T	T
T	F	F
F	T	T
F	F	T

3. IF(number_of_bedroom=count, then calculate_Price= Start)

When the number of bedroom is counted, the system is start to calculate the Price.

Count(number_of_bedroom)->Start(calculate_Price)

Number_of_bedroom	Price	Count(number_of_bedroom)->Set(calculate_Price)
T	T	T
T	F	F
F	T	T
F	F	T

4. If house_area=True, then signal= yellow

When house area is given, then the it will calculate part of house price that will show the yellow signal

True(house_area)->yellow(signal)

House_area	Signal	True(house_area)^yellow(signal)
T	T	T
T	F	F
F	T	T
F	F	T

5. If (house_area and number_of_bedroom)=True, then signal=Green

When the house_area and number_of_bedroom is True, then it will calculate the whole house price that will show the green singnal.

True(house_area and number_of_bedrooms)-> Green(signal)

House_area	Number_of_bedroom	Signal	House_area^Number_of_bedrooms	True(house_area and number_of_bedrooms)-> Green(signal)
T	T	T	T	T
T	T	F	T	F
T	F	T	F	T
T	F	F	F	T
F	T	T	F	T
F	T	F	F	T
F	F	T	F	T
F	F	F	F	T

6. If (house_area and number_of_bedroom)=FALSE, then signal=Green

When the house_area and number_of_bedroom is FALSE, then it will calculate the whole house price that will show the RED singnal.

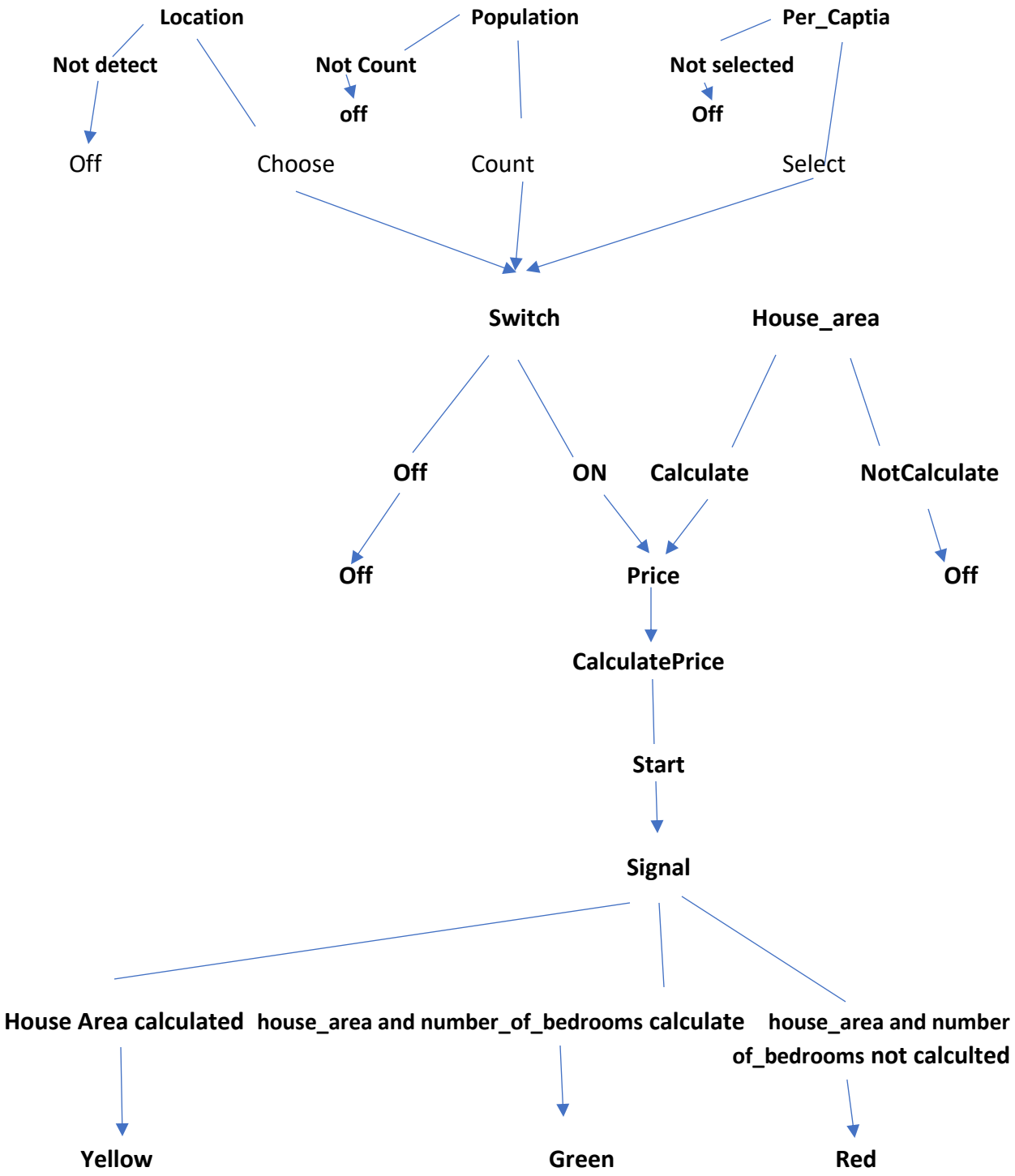
True(house_area and number_of_bedrooms)-> RED(signal)

House_area	Number_of_bedroom	Signal	House_area^Number_of_bedrooms	True(house_area and number_of_bedrooms)-> RED(signal)
T	T	T	T	T
T	T	F	T	F
T	F	T	F	T
T	F	F	F	T
F	T	T	F	T
F	T	F	F	T
F	F	T	F	T
F	F	F	F	T

Progress 3- State Space Search
Theme: Predict House Price

Date of Submission

11th January, 2020


Location
Population
Per_Captia
Not detect
Not Count
Not selected
off
Off
Off
Choose
Count
Select
Switch
House_area
Off
ON
Calculate
NotCalculate
Off
Price
Off
CalculatePrice
Start
Signal
House Area calculated
house_area and number_of_bedrooms calculate
house_area and number of_bedrooms not calculted
Yellow
Green
Red

Initial State= Location, Population, Per_Captia

Actions=Switch, House_area, calculatePrice,numberOfBedrooms

Goal=Signal(yellowor green orred)

Pasths=Off,On,calculate, Not calculate,set,start, House Area calculated, house_area and number_of_bedrooms calculate , house_area and number of_bedrooms not calculted .

When Location is chosen, population is count, percaptia is selected. Then the sensor will be activated. Then house area and number of bedrooms is calculated , and predict the house price. Signal will turn to yellow, that's mean house area is counted, House area and number of bedrooms both is calculate then the signal turn to green, otherwise the signal turn to red.

Progress 4- Intelligent Agent
Theme: Predict House Price

Date of Submission
20th January, 2021

Performances	Accuracy, Predict House Price
Environments	House Area, Bedroom
Actuators	Screen display, Price calculator, Signal indicator
Sensors	Location, Population

Table : PEAS Model

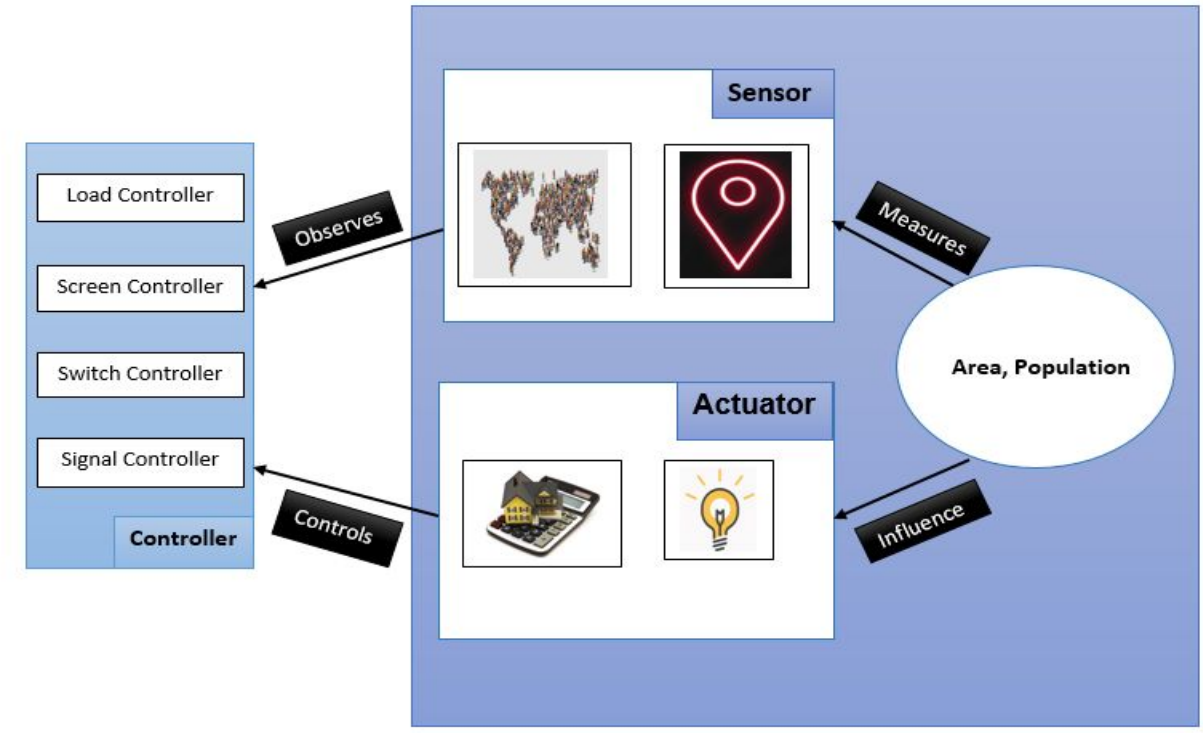


Figure: PEAS Model

Predict Housing Price calculation when location is chosen, population is count, per capita is selected. Firstly, there are four controllers. They are: Load, screen, switch, and signal controller. The load controller is used to measure the location of the house which is sensed by the load sensor and causes the sensor to activate. In order to proceed with home price calculation, users need to choose their home type to allow the calculator to calculate the home price accurately. Signal controller is used when signals will turn to yellow, that's mean house area is counted, House area and number of bedrooms both is calculated then the signal turns to green, otherwise the signal turns to red. Screen will display the calculator house price that was obtained from the price calculator. The switch will indicate the house area and bedrooms by changing the switch color that is controlled by the switch controller.