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Branch: TE Comps

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Experiment 7

Aim: To design and implement an expert system, incorporating the match algorithm and the rule language.

1. It should provide a fact base updating function.
2. It should provide a function that check the rules' LHS and return which rules were matched.
3. It should support firing RHS according to matches.

Theory:

An expert system is a computer program that is designed to solve complex problems and to provide decision-making ability like a human expert. It performs this by extracting knowledge from its knowledge base using the reasoning and inference rules according to the user queries. The expert system is a part of AI, and the first ES was developed in the year 1970, which was the first successful approach of artificial intelligence. It solves the most complex issue as an expert by extracting the knowledge stored in its knowledge base. The system helps in decision making for complex problems using both facts and heuristics like a human expert. It is called so because it contains the expert knowledge of a specific domain and can solve any complex problem of that particular domain. These systems are designed for a specific domain, such as medicine, science, etc.

The performance of an expert system is based on the expert's knowledge stored in its knowledge base. The more knowledge stored in the KB, the more that system improves its performance. One of the common examples of an ES is a suggestion of spelling errors while typing in the Google search box.

Problem Statement:

Read the below passage carefully and answer the questions: Five cities all got more rain than usual this year. The five cities are: Last Stand, Mile City, New Town, Olliopolis, and Polberg. The cities are located in five different areas of the country: the mountains, the forest, the coast, the desert, and in a valley.

- The rainfall amounts were: 12 inches, 27 inches, 32 inches, 44 inches, and 65 inches.
- The city in the desert got the least rain; the city in the forest got the most rain.
- New Town is in the mountains.
- Last Stand got more rain than Olliopolis.
- Mile City got more rain than Polberg, but less rain than New Town.
- Olliopolis got 44 inches of rain.
- The city in the mountains got 32 inches of rain; the city on the coast got 27 inches of rain.

1. Which city got the most rain?
2. How much rain did Mile City get?
3. Which city is in the desert ?
4. Where is Olliopolis located?

Code:

city(C) :-

```
length(C, 5),  
member(h('Last Stand', _, _), C),  
member(h('Mile City', _, _), C),  
member(h('New Town', _, _), C),  
member(h('Olliopolis', _, _), C),
```

```

member(h('Polberg', _, _), C),
member(h(_, mountains, _), C),
member(h(_, forest, _), C),
member(h(_, coast, _), C),
member(h(_, desert, _), C),
member(h(_, valley, _), C),
member(h(_, _, 12), C),
member(h(_, _, 27), C),
member(h(_, _, 32), C),
member(h(_, _, 44), C),
member(h(_, _, 65), C),
member(h(_, desert, 12), C),
member(h(_, forest, 65), C),
member(h('New Town', mountains, _), C),
member(h('Last Stand', _, A), C),
member(h('Olliopolis', _, B), C),
A > B,
member(h('Mile City', _, D), C),
member(h('Polberg', _, E), C),
D > E,
member(h('New Town', _, F), C),
F > D,
member(h('Olliopolis', _, 44), C),
member(h(_, mountains, 32), C),
member(h(_, coast, 27), C).

```

rain_amount(City_Name, Rainfall_Amount) :-

```

city(C),
member(h(City_Name, _, Rainfall_Amount), C),

```

```
write(City_Name), write(" received "),write(Rainfall_Amount), write(" inches of rain."),nl.
```

city_region(City_Name, Region) :-


```
city(C),
```

```
member(h(City_Name, Region, _), C),
```

```
write(City_Name), write(" is located in the "),write(Region), nl.
```

Execution:


1. Which city got the most rain?

```
 rain_amount(_,65).
```

Last Stand received 65 inches of rain.

true

2. How much rain did Mile City get?

```
 rain_amount('Mile City',_).
```

Mile City received 27 inches of rain.

true


3. Which city is in the desert ?

```
 city_region(_,desert).
```

Polberg is located in the desert

true

4. Where is Olliopolis located?

```
 city_region('Olliopolis',_).
```

Olliopolis is located in the valley

true

Conclusion:

Learnt about PROLOG, and solving logical problems using a declarative programming style.
Also implementing an expert system using the match algorithm.