KINGDOM OF SAUDI ARABIA
MINISTRY OF HIGHER EDUCATION
TAIBAH UNIVERSITY (039)
COLLEGE OF COMPUTER SCIENCE AND ENGINEERING (CCSE)

FLOWERS IDENTIFICATION SYSTEM

CS211 PROJECT

Intelligent Systems

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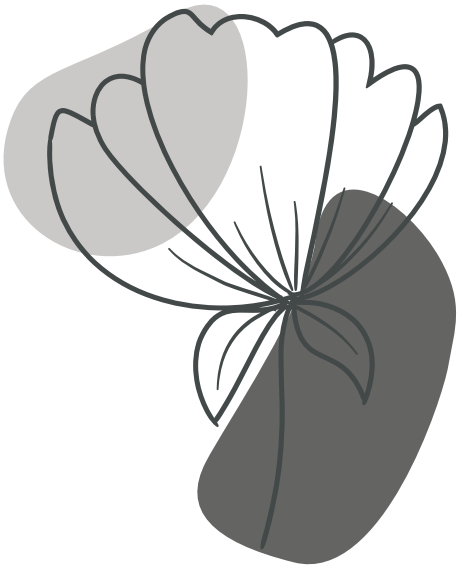


1. INTRODUCTION

Flowers are one of the most beautiful and diverse creations of nature. Identifying different types of flowers can be a daunting task, especially for those who are not familiar with the botanical world. To address this challenge, we have developed a flowers identification system by using Prolog language to identify different types of flowers. However if the system developed in the future to become an expert system, it will be helpful for botanists, florists, and other professionals in the field of horticulture to identify flowers accurately and quickly.

The system works by using a set of rules and facts to match the characteristics of a flower with those of known flower types. The user inputs the characteristics of the flower they are trying to identify, and the system returns a list of possible matches. If there are multiple matches for a given set of characteristics (e.g., if there are multiple types of pink, flowers), the system can return all possible matches.

Parts of flower:

1- Petal: The parts of a flower that are often conspicuously colored.

2- Sepal: The outer parts of the flower (often green and leaf-like) that enclose a developing bud.

3- Stamen: The male fertilizing organ of a flower.

4- Carpel: The female reproductive organ of a flower.

Figure 1

Parts of a flower

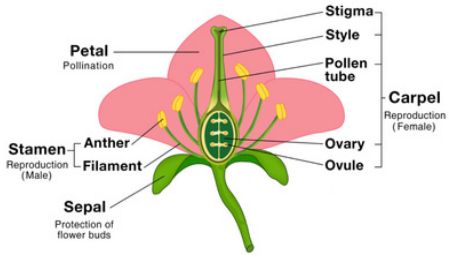


Table 1

Structural differences of flowers

Complete flowers	**Incomplete flowers**
Flowers, in which all four whorls are present are known as complete flowers.	Flowers, in which any one or more whorls are missing are known as incomplete flowers.
Bisexual flowers	**Unisexual flowers**
A flower which has bothmale and female reproductive organs in separate flowers.	A flower which has either the male or female reproductive organs in separate flowers.
Monocot flowers	**Dicot flowers**
A flower which has either 3 petals or the number of petals are multiple of three.	A flower which has up to 4-5 petals or the number of petals is multiple of 4-5.

Table 2

Names of flowers and their characteristics

Names of flowers	Color	Petals	Sepals	Stamen	Carpel	Complete or Incomplete flowers	Bisexual or Unisexual flowers	Monocot or Dicot flowers
1-Cucumber flower	Yellow	usually 5	✔	✔	✖	Incomplete flowers	Unisexual flowers	Dicot flowers
2- Pumpkin flower	Orange	usually 5	✔	✖	✔	Incomplete flowers	Unisexual flowers	Dicot flowers
3- Daisy	White	usually 10	✔	✔	✖	Incomplete flowers	Unisexual flowers	Dicot flowers
4- Lavender	Purple	usually 5	✔	✔	✔	Complete flowers	Bisexual flowers	Dicot flowers
5- Sunflower	Yellow	usually 50	✔	✔	✔	Complete flowers	Bisexual flowers	Dicot flowers
6- Tulip	Red, pink and purple	usually 6	✔	✔	✔	Complete flowers	Bisexual flowers	Monocot flowers
7- Daffodils	White and yellow	usually 6	✖	✔	✖	Incomplete flowers	Unisexual flowers	Monocot flowers
8- Orchid	White, yellow and pink	3	✔	✔	✔	Complete flowers	Bisexual flowers	Monocot flowers

Table 3

Names of flowers and their seasons

Names of flowers	Flowers shape	Winter	Summer	Autumn	Spring
1-Cucumber flower			✔		✔
2- Pumpkin flower					✔
3- Daisy				✔	✔
4- Lavender		✔	✔	✔	✔
5- Sunflower			✔		
6- Tulip		✔			✔
7- Daffodils		✔			
8- Orchid			✔	✔	

2. KNWOLEDEGE BASE

Table 4

Facts & rules

Names of flowers	flower(cucumber). flower(pumpkin). flower(daisy). flower(lavender). flower(sunflower). flower(tulip). flower(daffodils). flower(orchid).	**Flowers that have petals**	have(cucumber, petals). have(pumpkin, petals). have(daisy, petals). have(lavender, petals). have(sunflower, petals). have(tulip, petals). have(daffodils, petals). have(orchid, petals).	**Flowers that have carpels**	have(pumpkin, carpels). have(lavender, carpels). have(sunflower, carpels). have(tulip, carpels). have(orchid, carpels).
Colors of flowers	color(cucumber, yellow). color(pumpkin, orange). color(daisy, white). color(lavender, purple). color(sunflower, yellow). color(tulip, red). color(tulip, pink). color(tulip, purple). color(daffodils, white). color(daffodils, yellow). color(orchid, white). color(orchid, yellow). color(orchid, pink).	**Flowers that have sepals**	have(cucumber, sepals). have(pumpkin, sepals). have(daisy, sepals). have(lavender, sepals). have(sunflower, sepals). have(tulip, sepals). have(orchid, sepals).	**Flowers that don't have sepals**	not_have(daffodils, sepals).
Number of petals	petals(cucumber, 5). petals(pumpkin, 5). petals(daisy, 10). petals(lavender, 5). petals(sunflower, 50). petals(tulip, 6). petals(daffodils, 6). petals(orchid, 3).	**Flowers that have stamens**	have(cucumber, stamens). have(daisy, stamens). have(lavender, stamens). have(sunflower, stamens). have(tulip, stamens). have(daffodils, stamens). have(orchid, stamens).	**Flowers that don't have stamens**	not_have(pumpkin, stamens).

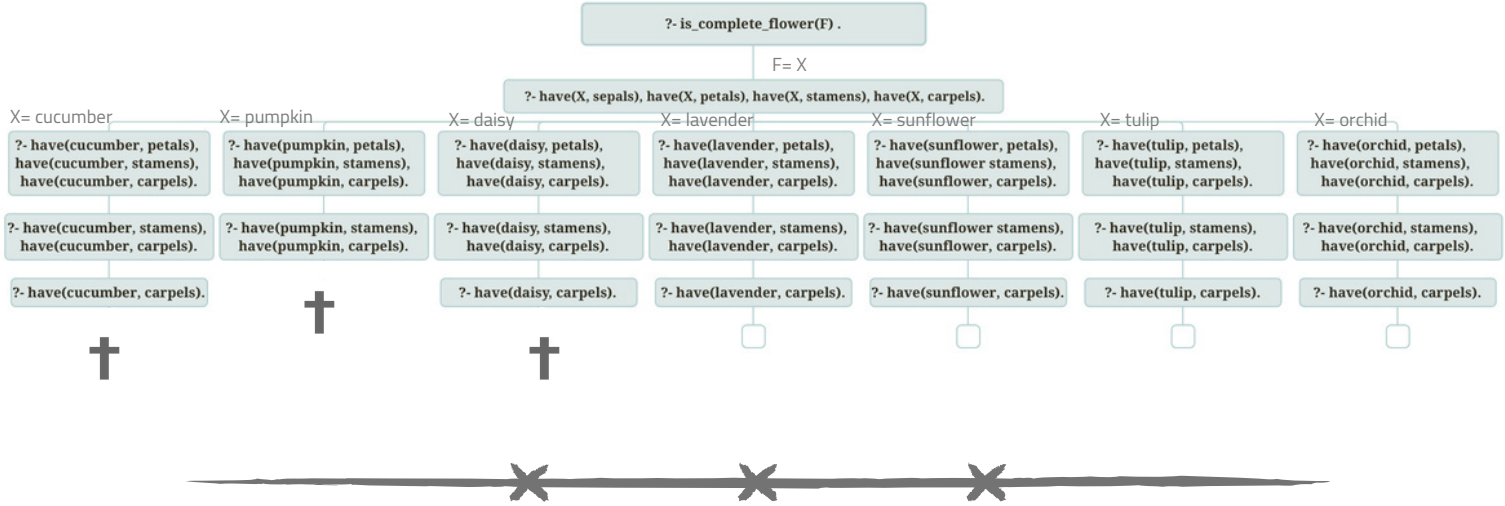
Flowers that don't have carpels	not_have(cucumber, carpels). not_have(daisy, carpels). not_have(daffodils, carpels).	**Flowers seasons**	winter_flower(lavender). winter_flower(tulip). summer_flower(lavender). summer_flower(cucumber). summer_flower(sunflower). summer_flower(orchid). spring_flower(lavender). spring_flower(tulip). spring_flower(cucumber). spring_flower(pumpkin). spring_flower(daisy). autumn_flower(lavender). autumn_flower(daisy). autumn_flower(orchid).
Rules	is_complete_flower(X) :- have(X, sepals), have(X, petals), have(X, stamens), have(X, carpels). is_incomplete_flower(X) :- not_have(X, sepals); not_have(X, petals); not_have(X, stamens); not_have(X, carpels). is_bisexual_flower(X) :- have(X, stamens), have(X, carpels). is_unisexual_flower(X) :- not_have(X, stamens); not_have(X, carpels). three_or_multiple_of_3(N) :- 0 is mod(N,3). four_or_multiple_of_4(N) :- 0 is mod(N,4). five_or_multiple_of_5(N) :- 0 is mod(N,5). is_monocot_flower(X) :- petals(X,N),three_or_multiple_of_3(N) . is_dicot_flower(X) :- petals(X, N),(four_or_multiple_of_4(N); five_or_multiple_of_5(N)).		

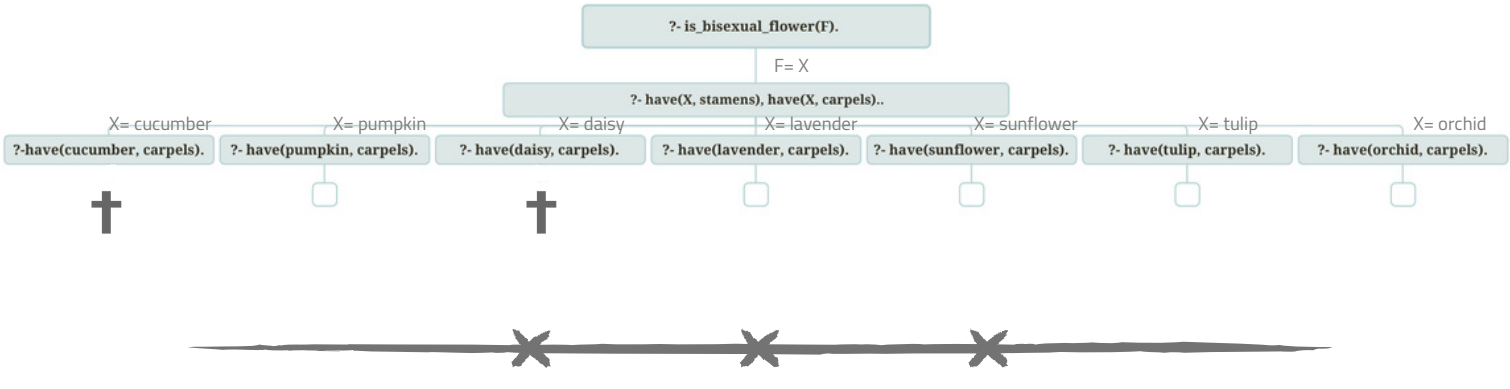
3. CODES

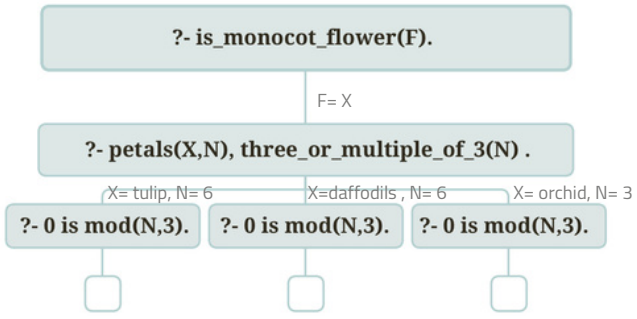
```
/*Knowledge Base of flowers identification system*/
/*Facts*/

/*Names of flowers*/
flower(cucumber).
flower(pumpkin).
flower(daisy).
flower(lavender).
flower(sunflower).
flower(tulip).
flower(daffodils).
flower(orchid).

/*Colors of flowers*/
color(cucumber, yellow).
color(pumpkin, orange).
color(daisy, white).
color(lavender, purple).
color(sunflower, yellow).
color(tulip, red).
color(tulip, pink).
color(tulip, purple).
color(daffodils, white).
color(daffodils, yellow).
color(orchid, white).
color(orchid, yellow).
color(orchid, pink).

/*Number of petals*/
petals(cucumber, 5).
petals(pumpkin, 5).
petals(daisy, 10).
petals(lavender, 5).
petals(sunflower, 50).
petals(tulip, 6).
petals(daffodils, 6).
petals(orchid, 3).

/*Flowers that have petals*/
have(cucumber, petals).
have(pumpkin, petals).
have(daisy, petals).
have(lavender, petals).
have(sunflower, petals).
have(tulip, petals).
have(daffodils, petals).
have(orchid, petals).

/*Flowers that have sepals*/
have(cucumber, sepals).
have(pumpkin, sepals).
have(daisy, sepals).
have(lavender, sepals).
have(sunflower, sepals).
have(tulip, sepals).
have(orchid, sepals).
```

```
/*Flowers that have stamens*/
have(cucumber, stamens).
have(daisy, stamens).
have(lavender, stamens).
have(sunflower, stamens).
have(tulip, stamens).
have(daffodils, stamens).
have(orchid, stamens).

/*Flowers that have carpels*/
have(pumpkin, carpels).
have(lavender, carpels).
have(sunflower, carpels).
have(tulip, carpels).
have(orchid, carpels).

/*Flowers that don't have sepals*/
not_have(daffodils, sepals).

/*Flowers that don't stamens*/
not_have(pumpkin, stamens).

/*Flowers that don't carpels*/
not_have(cucumber, carpels).
not_have(daisy, carpels).
not_have(daffodils, carpels).

/*Flowers seasons*/
winter_flower(lavender).
winter_flower(tulip).
summer_flower(lavender).
summer_flower(cucumber).
summer_flower(sunflower).
summer_flower(orchid).
spring_flower(lavender).
spring_flower(tulip).
spring_flower(cucumber).
spring_flower(pumpkin).
spring_flower(daisy).
autumn_flower(lavender).
autumn_flower(daisy).
autumn_flower(orchid).

/* Rules*/
is_complete_flower(X) :- have(X, sepals), have(X, petals), have(X, stamens),
    have(X, carpels).
is_incomplete_flower(X) :- not_have(X, sepals); not_have(X, petals);
    not_have(X, stamens); not_have(X, carpels).

is_bisexual_flower(X) :- have(X, stamens), have(X, carpels).
is_unisexual_flower(X) :- not_have(X, stamens); not_have(X, carpels).

three_or_multiple_of_3(N) :- 0 is mod(N,3).
four_or_multiple_of_4(N) :- 0 is mod(N,4).
five_or_multiple_of_5(N) :- 0 is mod(N,5).

is_monocot_flower(X) :- petals(X,N),three_or_multiple_of_3(N) .
is_dicot_flower(X) :- petals(X, N),(four_or_multiple_of_4(N);five_or_multiple_of_5(N)).

```

4. SEARCH TREE





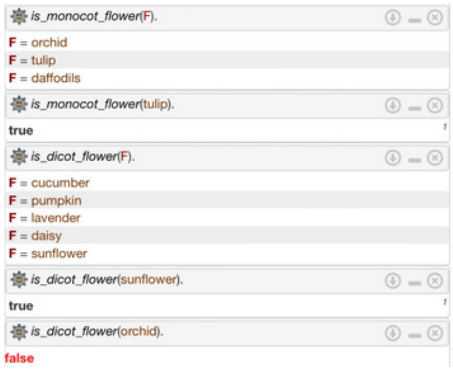


5. SAMPLE OUTPUTS

Table 5

Sample outputs

<table>
<tr>
<td>Flower</td>
<td>
flower(F).
F = cucumber
F = pumpkin
F = daisy
F = lavender
F = sunflower
F = tulip
F = daffodils
F = orchid
flower(lavender).
true
flower(lion).
false
</td>
<td rowspan="2">Number of petals</td>
<td rowspan="2">
petals(lavender, P).
P = 5
petals(F, P).
F = cucumber,
P = 5
F = pumpkin,
P = 5
F = daisy,
P = 10
F = lavender,
P = 5
F = sunflower,
P = 50
F = tulip,
P = 6
F = daffodils,
P = 6
F = orchid,
P = 3
petals(F, 5).
F = cucumber
F = pumpkin
F = lavender
</td>
</tr>
<tr>
<td>Colors of flowers</td>
<td>
color(F, pink).
F = tulip
F = orchid
color(lavender, C).
C = purple
color(F, C).
C = yellow,
F = cucumber
C = orange,
F = pumpkin
C = white,
F = daisy
C = purple,
F = lavender
C = yellow,
F = sunflower
C = red,
F = tulip
C = pink,
F = tulip
C = purple,
F = tulip
C = white,
F = daffodils
C = yellow,
F = daffodils
C = white,
F = orchid
C = yellow,
F = orchid
C = pink,
F = orchid
color(F, yellow).
F = cucumber
F = sunflower
F = daffodils
F = orchid
</td>
</tr>
</table>

Flowers that have [petals or sepals or stamens or carpels]		**Bisexual or unisexual**	
Flowers that don't have [petals or sepals or stamens or carpels]		**Monocot or dicot**	
Complete or incomplete		**Flowers seasons**	

6. PLAGIARISM CHECK RESULT

Figure 2

Plagiarism check result by grammarly website

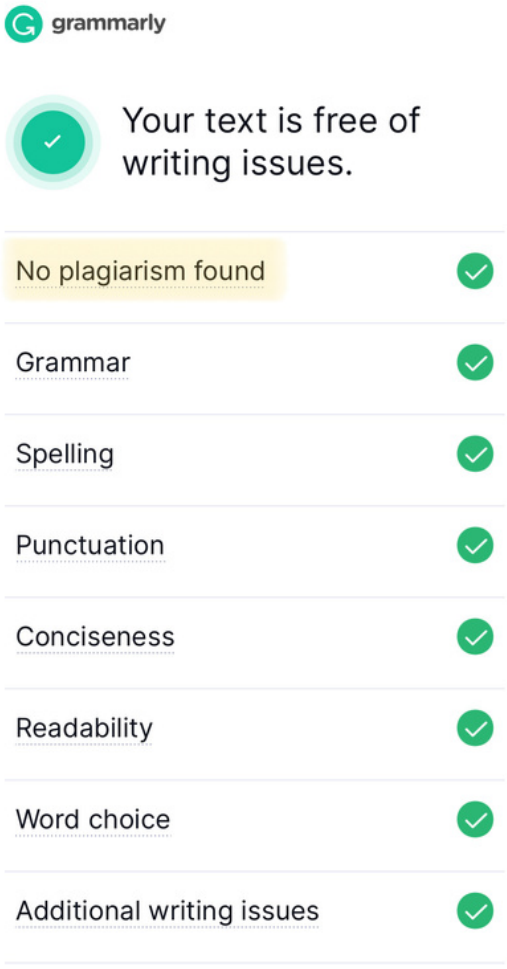
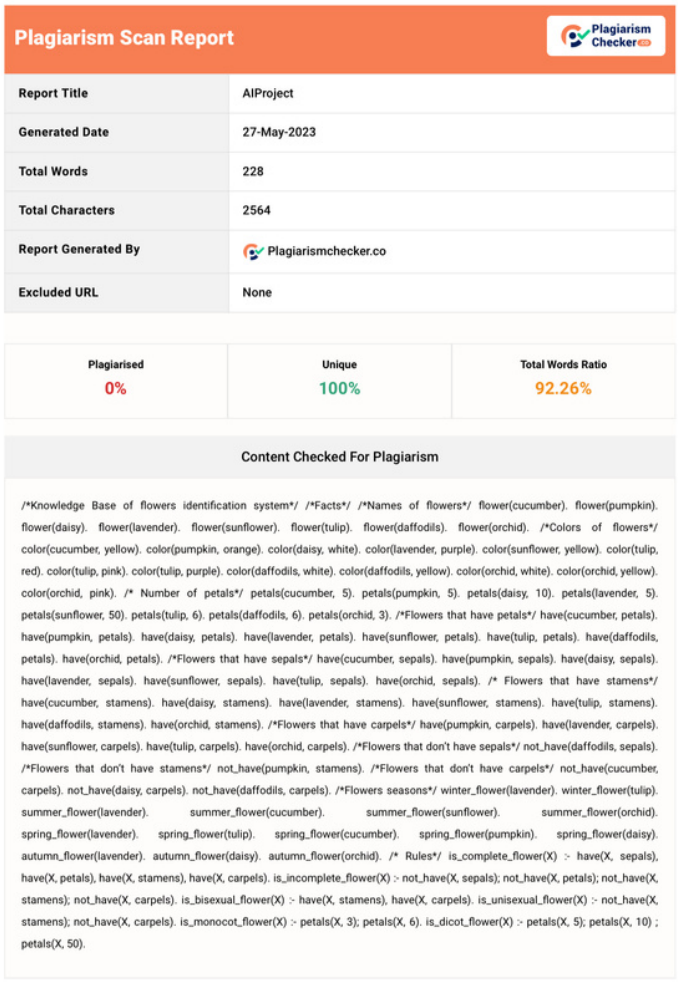


Figure 3

Plagiarism check result by plagiarismchecker.co website



Plagiarism Scan Report

Report Title	AIProject
Generated Date	27-May-2023
Total Words	228
Total Characters	2564
Report Generated By	Plagiarismchecker.co
Excluded URL	None

Plagiarised	Unique	Total Words Ratio
0%	100%	92.26%

Content Checked For Plagiarism

/*Knowledge Base of flowers identification system*/ /*Facts*/ /*Names of flowers*/ flower(cucumber). flower(pumpkin). flower(daisy). flower(lavender). flower(sunflower). flower(tulip). flower(daffodils). flower(orchid). /*Colors of flowers*/ color(cucumber, yellow). color(pumpkin, orange). color(daisy, white). color(lavender, purple). color(sunflower, yellow). color(tulip, red). color(tulip, pink). color(tulip, purple). color(daffodils, white). color(daffodils, yellow). color(orchid, white). color(orchid, yellow). color(orchid, pink). /* Number of petals*/ petals(cucumber, 5). petals(pumpkin, 5). petals(daisy, 10). petals(lavender, 5). petals(sunflower, 50). petals(tulip, 6). petals(daffodils, 6). petals(orchid, 3). /*Flowers that have petals*/ have(cucumber, petals). have(pumpkin, petals). have(daisy, petals). have(lavender, petals). have(sunflower, petals). have(tulip, petals). have(daffodils, petals). have(orchid, petals). /*Flowers that have sepals*/ have(cucumber, sepals). have(pumpkin, sepals). have(daisy, sepals). have(lavender, sepals). have(sunflower, sepals). have(tulip, sepals). have(orchid, sepals). /* Flowers that have stamens*/ have(cucumber, stamens). have(daisy, stamens). have(lavender, stamens). have(sunflower, stamens). have(tulip, stamens). have(daffodils, stamens). have(orchid, stamens). /*Flowers that have carpels*/ have(pumpkin, carpels). have(lavender, carpels). have(sunflower, carpels). have(tulip, carpels). have(orchid, carpels). /*Flowers that don't have sepals*/ not_have(daffodils, sepals). /*Flowers that don't have stamens*/ not_have(pumpkin, stamens). /*Flowers that don't have carpels*/ not_have(cucumber, carpels). not_have(daisy, carpels). not_have(daffodils, carpels). /*Flowers seasons*/ winter_flower(lavender). winter_flower(tulip). summer_flower(lavender). summer_flower(cucumber). summer_flower(sunflower). summer_flower(orchid). spring_flower(lavender). spring_flower(tulip). spring_flower(cucumber). spring_flower(pumpkin). spring_flower(daisy). autumn_flower(lavender). autumn_flower(daisy). autumn_flower(orchid). /* Rules*/ is_complete_flower(X) :- have(X, sepals), have(X, petals), have(X, stamens), have(X, carpels). is_incomplete_flower(X) :- not_have(X, sepals); not_have(X, petals); not_have(X, stamens); not_have(X, carpels). is_bisexual_flower(X) :- have(X, stamens), have(X, carpels). is_unisexual_flower(X) :- not_have(X, stamens); not_have(X, carpels). is_monocot_flower(X) :- petals(X, 3); petals(X, 6). is_dicot_flower(X) :- petals(X, 5); petals(X, 10) ; petals(X, 50).

7. GROUP TASK DIVISION

Table 6

Group task division

Student name	Introduction	First classification (flowers characteristics) and coding for it.	Second classification (flowers seasons) and coding for it.	Queries	Search tree	File format
Lama	✔	✔			✔	✔
Ummkalthoom					✔	
Afrah				✔		
Mawada			✔			