

# FLOWERS IDENTIFICATION SYSTEM

CS211 PROJECT

Intelligent Systems

## Team Members

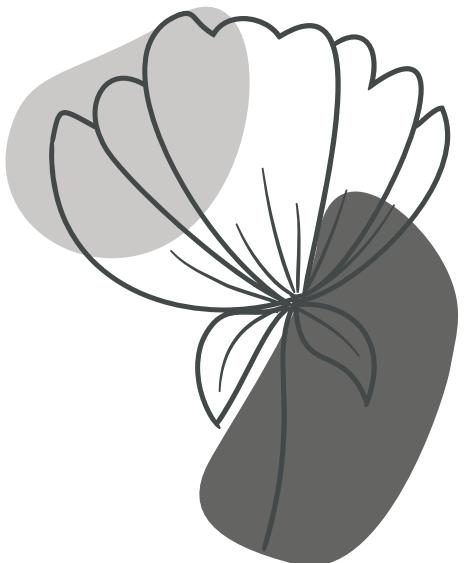
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# 1. INTRODUCTION

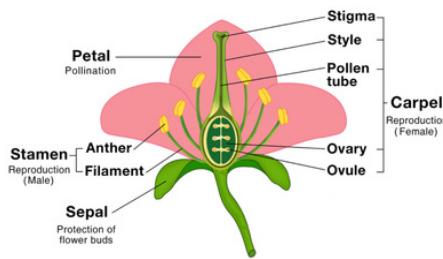
Flowers are one of the most beautiful and diverse creations of nature. Identifying different types of flowers can be a daunting task, especially for those who are not familiar with the botanical world. To address this challenge, we have developed a flowers identification system by using Prolog language 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**

<b>Complete flowers</b>	<b>Incomplete flowers</b>
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.
<b>Bisexual flowers</b>	<b>Unisexual flowers</b>
A flower which has both male and female reproductive organs in separate flowers.	A flower which has either the male or female reproductive organs in separate flowers.
<b>Monocot flowers</b>	<b>Dicot flowers</b>
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**

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

**Table 3*****Names of flowers and their seasons***

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

## 2. KNOWLEDGE BASE

**Table 4**

**Facts & rules**

<b>Names of flowers</b>	flower(cucumber). flower(pumpkin). flower(daisy). flower(lavender). flower(sunflower). flower(tulip). flower(daffodils). flower(orchid).	<b>Flowers that have petals</b>	have(cucumber, petals). have(pumpkin, petals). have(daisy, petals). have(lavender, petals). have(sunflower, petals). have(tulip, petals). have(daffodils, petals). have(orchid, petals).	<b>Flowers that have carpels</b>	have(pumpkin, carpels). have(lavender, carpels). have(sunflower, carpels). have(tulip, carpels). have(orchid, carpels).
<b>Colors of flowers</b>	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).	<b>Flowers that have sepals</b>	have(cucumber, sepals). have(pumpkin, sepals). have(daisy, sepals). have(lavender, sepals). have(sunflower, sepals). have(tulip, sepals). have(orchid, sepals).	<b>Flowers that don't have sepals</b>	not_have(daffodils, sepals).
<b>Number of petals</b>	petals(cucumber, 5). petals(pumpkin, 5). petals(daisy, 10). petals(lavender, 5). petals(sunflower, 50). petals(tulip, 6). petals(daffodils, 6). petals(orchid, 3).	<b>Flowers that have stamens</b>	have(cucumber, stamens). have(daisy, stamens). have(lavender, stamens). have(sunflower, stamens). have(tulip, stamens). have(daffodils, stamens). have(orchid, stamens).	<b>Flowers that don't have stamens</b>	not_have(pumpkin, stamens).

<b>Flowers that don't have carpels</b>	not_have(cucumber, carpels). not_have(daisy, carpels). not_have(daffodils, carpels).	<b>Flowers seasons</b>	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).
<b>Rules</b>	<pre> 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)). </pre>		

# 3. CODES

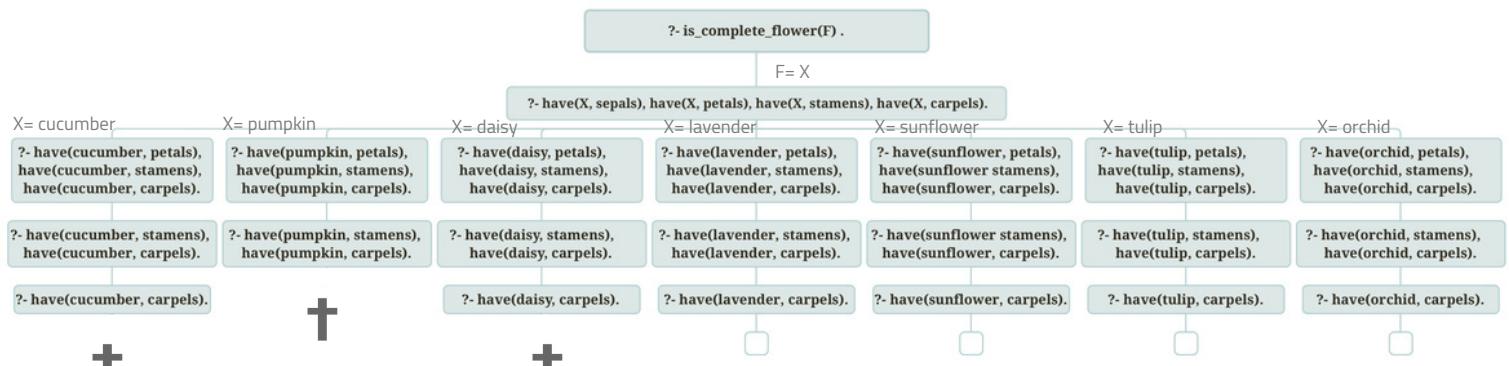
```
1 /*Knowledge Base of flowers identification system*/
2 /*Facts*/
3
4 /*Names of flowers*/
5 flower(cucumber).
6 flower(pumpkin).
7 flower(daisy).
8 flower(lavender).
9 flower(sunflower).
10 flower(tulip).
11 flower(daffodils).
12 flower(orchid).
13
14 /*Colors of flowers*/
15 color(cucumber, yellow).
16 color(pumpkin, orange).
17 color(daisy, white).
18 color(lavender, purple).
19 color(sunflower, yellow).
20 color(tulip, red).
21 color(tulip, pink).
22 color(tulip, purple).
23 color(daffodils, white).
24 color(daffodils, yellow).
25 color(orchid, white).
26 color(orchid, yellow).
27 color(orchid, pink).
28
29 /*Number of petals*/
30 petals(cucumber, 5).
31 petals(pumpkin, 5).
32 petals(daisy, 10).
33 petals(lavender, 5).
34 petals(sunflower, 50).
35 petals(tulip, 6).
36 petals(daffodils, 6).
37 petals(orchid, 3).
38
39 /*Flowers that have petals*/
40 have(cucumber, petals).
41 have(pumpkin, petals).
42 have(daisy, petals).
43 have(lavender, petals).
44 have(sunflower, petals).
45 have(tulip, petals).
46 have(daffodils, petals).
47 have(orchid, petals).
48
49 /*Flowers that have sepals*/
50 have(cucumber, sepals).
51 have(pumpkin, sepals).
52 have(daisy, sepals).
53 have(lavender, sepals).
54 have(sunflower, sepals).
55 have(tulip, sepals).
56 have(orchid, sepals).
```

```

58 /*Flowers that have stamens*/
59 have(cucumber, stamens).
60 have(daisy, stamens).
61 have(lavender, stamens).
62 have(sunflower, stamens).
63 have(tulip, stamens).
64 have(daffodils, stamens).
65 have(orchid, stamens).
66
67 /*Flowers that have carpels*/
68 have(pumpkin, carpels).
69 have(lavender, carpels).
70 have(sunflower, carpels).
71 have(tulip, carpels).
72 have(orchid, carpels).
73
74 /*Flowers that don't have sepals*/
75 not_have(daffodils, sepals).
76
77 /*Flowers that don't stamens*/
78 not_have(pumpkin, stamens).
79
80 /*Flowers that don't carpels*/
81 not_have(cucumber, carpels).
82 not_have(daisy, carpels).
83 not_have(daffodils, carpels).
84
85 /*Flowers seasons*/
86 winter_flower(lavender).
87 winter_flower(tulip).
88 summer_flower(lavender).
89 summer_flower(cucumber).
90 summer_flower(sunflower).
91 summer_flower(orchid).
92 spring_flower(lavender).
93 spring_flower(tulip).
94 spring_flower(cucumber).
95 spring_flower(pumpkin).
96 spring_flower(daisy).
97 autumn_flower(lavender).
98 autumn_flower(daisy).
99 autumn_flower(orchid).
100
101 /* Rules*/
102 is_complete_flower(X) :- have(X, sepals), have(X, petals), have(X, stamens),
103     have(X, carpels).
104 is_incomplete_flower(X) :- not_have(X, sepals); not_have(X, petals);
105     not_have(X, stamens); not_have(X, carpels).
106
107 is_bisexual_flower(X) :- have(X, stamens), have(X, carpels).
108 is_unisexual_flower(X) :- not_have(X, stamens); not_have(X, carpels).
109
110 three_or_multiple_of_3(N) :- 0 is mod(N,3).
111 four_or_multiple_of_4(N) :- 0 is mod(N,4).
112 five_or_multiple_of_5(N) :- 0 is mod(N,5).
113
114 is_monocot_flower(X) :- petals(X,N),three_or_multiple_of_3(N) .
115 is_dicot_flower(X) :- petals(X, N),(four_or_multiple_of_4(N);five_or_multiple_of_5(N)).
116

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# 4. SEARCH TREE



+

+

+

+

+

+



?- is\_bisexual\_flower(F) .

F = X

+

+

+



?- is\_monocot\_flower(F) .

F = X

?- petals(X,N), three\_or\_multiple\_of\_3(N) .

X=tulip, N=6

X=daffodils, N=6

X=orchid, N=3

?- 0 is mod(N,3).

?- 0 is mod(N,3).

?- 0 is mod(N,3).



# 5. SAMPLE OUTPUTS

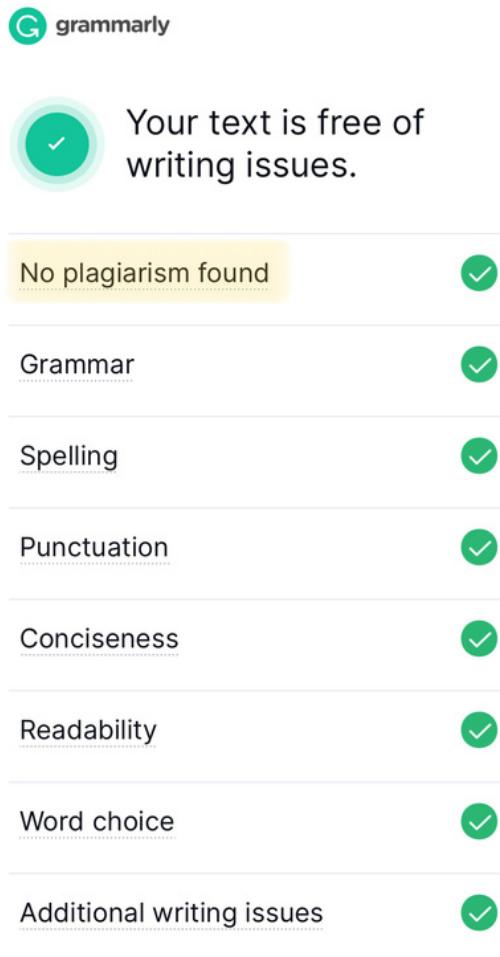
**Table 5**  
*Sample outputs*

Flower	<pre>F = cucumber F = pumpkin F = daisy F = lavender F = sunflower F = tulip F = daffodils F = orchid</pre> <pre>true</pre> <pre>false</pre>		
Colors of flowers	<pre>F = tulip F = orchid</pre> <pre>C = purple</pre> <pre>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</pre> <pre>F = cucumber F = sunflower F = daffodils F = orchid</pre>	Number of petals	<pre>P = 5</pre> <pre>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</pre> <pre>F = cucumber F = pumpkin F = lavender</pre>

<p><b>Flowers that have [petals or sepals or stamens or carpels]</b></p>	<pre> <b>have(orchid, petals).</b> true <b>have(F, petals).</b> F = cucumber F = pumpkin <b>have(orchid, sepals).</b> true <b>have(daisy, P).</b> P = petals P = sepals <b>have(F, sepals).</b> F = cucumber F = pumpkin F = daisy F = lavender F = sunflower F = tulip F = orchid <b>have(F, carpels).</b> F = pumpkin Next 10 100 1,000 Stop <b>have(lavender, X).</b> X = petals X = sepals X = stamens <b>have(daisy, carpels).</b> false <b>have(daisy, X).</b> X = petals X = sepals </pre>	<p><b>Bisexual or unisexual</b></p>	<pre> <b>is_bisexual_flower(F).</b> F = lavender F = sunflower F = tulip F = orchid <b>is_unisexual_flower(F).</b> F = pumpkin F = cucumber F = daisy F = daffodils <b>is_bisexual_flower(tulip).</b> true </pre>
<p><b>Flowers that don't have [petals or sepals or stamens or carpels]</b></p>	<pre> <b>not_have(F, carpels).</b> F = cucumber F = daisy F = daffodils <b>not_have(F, sepals).</b> F = daffodils <b>not_have(F, stamens).</b> F = pumpkin </pre>	<p><b>Monocot or dicot</b></p>	<pre> <b>is_monocot_flower(F).</b> F = orchid F = tulip F = daffodils <b>is_monocot_flower(tulip).</b> true <b>is_dicot_flower(F).</b> F = cucumber F = pumpkin F = lavender F = daisy F = sunflower <b>is_dicot_flower(sunflower).</b> true <b>is_dicot_flower(orcid).</b> false </pre>
<p><b>Complete or incomplete</b></p>	<pre> <b>is_complete_flower(F).</b> F = lavender F = sunflower F = tulip F = orchid <b>is_complete_flower(lavender).</b> true <b>is_complete_flower(pumpkin).</b> false <b>is_incomplete_flower(F).</b> F = daffodils F = pumpkin F = cucumber F = daisy F = daffodils <b>is_incomplete_flower(pumpkin).</b> true <b>is_incomplete_flower(lavender).</b> false </pre>	<p><b>Flowers seasons</b></p>	<pre> <b>winter_flower(lavender).</b> true <b>autumn_flower(X).</b> X = lavender X = daisy X = orchid <b>spring_flower(tulip).</b> true <b>summer_flower(daisy).</b> false </pre>

# 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	Plagiarism Checker
Generated Date	27-May-2023	
Total Words	228	
Total Characters	2564	
Report Generated By	Plagiarismchecker.co	
Excluded URL	None	
Plagiarised	0%	Unique 100% Total Words Ratio 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, petals); 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			✓			