



УНИВЕРСИТЕТ ИТМО

# Графовая база знаний “Домашние растения”

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# Задачи

- Классификация видов комнатных растений
- Получить информацию о средствах ухода за растением
- Выбрать группу комнатных растений под определенные домашние условия



# Свойства

Растение: окрас и форма листьев, наличие цветов или плодов, периоды цветения

Цветы: цвет, размер цветов

Плоды: цвет, размер, частота появления

## Источник данных

<https://extension.uga.edu/publications/detail.html?number=B1318&title=Growing%20Indoor%20Plants%20with%20Success>

**Indoor plants and their cultural requirements (adopted from McConnell, D. B. 1978)** ☆ 📌 ☁

Файл Правка Вид Вставка Формат Данные Инструменты Дополнения Справка [Последнее изменение: 47 минут назад](#)

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	A	B	C	D	E	F	G
1	Botanical name	Common name	Light	Temperature	Relative Humidity	Watering	Suggested Soil Mix
2	Abutilon hybridum	Flowering Maple	1	1	2	2	1
3	Acalypha hispida	Chenille Plant	1	2	2	2	1
4	Achimenes hybrids	Magic Flower	2	2	2	1	7
5	Acorus calamus	Sweet Flag	2-3	2	2	1	2
6	Acorus gramineus	Miniature Sweet Flag	2-3	2	2	1	2
7	Adiantum raddianum	Maidenhair Fern	2-3	2	1	1	6
8	Adromischus cristatus	Crinkle-Leaf Plant	2-3	2	2	2	5
9	Adromischus festivus	Plover Eggs	2-3	2	2	2	5
10	Aechmea fasciata	Silver Vase	2-3	2	2	2	3
11	Aechmea miniata 'Discolor'	Purplish Coral Berry	2-3	2	2	2	3

# Представление данных

result.txt - r63 - Visual Studio Code

main.py data.owl data.xml homeplants.owl result.txt

result.txt

1	Botanical name	Common name	Light
2	-----		
3	Abutilon hybridum	Flowering Maple	At least 4 h of direct sun
4	Acalypha hispida	Chenille Plant	At least 4 h of direct sun
5	Achimenes hybrids	Magic Flower	Over 200 ft-c, not direct sun
6	Acorus calamus	Sweet Flag	Over 200 ft-c, not direct sun
7	Acorus gramineus	Miniature Sweet Flag	Over 200 ft-c, not direct sun
8	Adiantum raddianum	Maidenhair Fern	Over 200 ft-c, not direct sun
9	Adromischus cristatus	Crinkle-Leaf Plant	Over 200 ft-c, not direct sun
10	Adromischus festivus	Plover Eggs	Over 200 ft-c, not direct sun
11	Aechmea fasciata	Silver Vase	Over 200 ft-c, not direct sun
12	Aechmea miniata 'Discolor'		
13	Aechmea 'Royal Wine'		

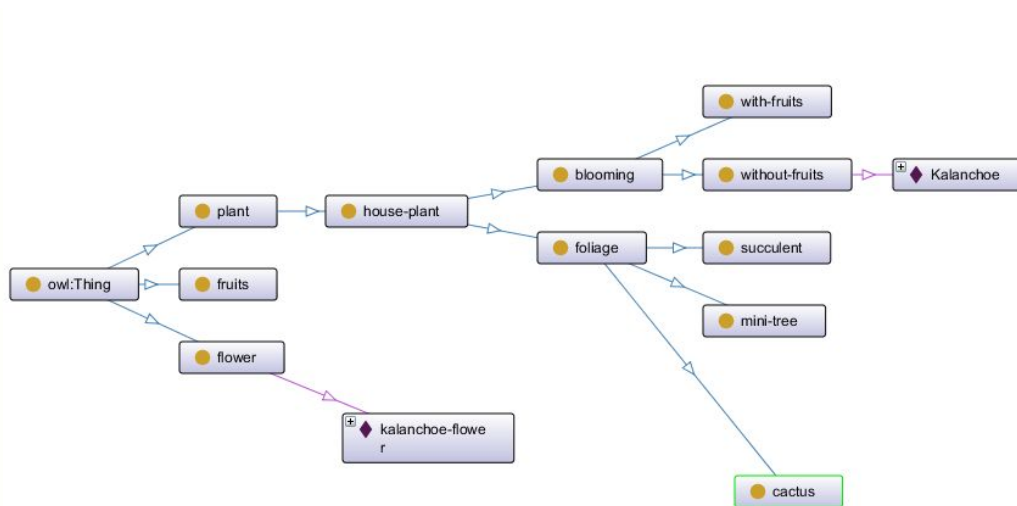
result.txt - r63 - Visual Studio Code

main.py data.owl data.xml homeplants.owl result.txt

result.txt

1	Temperature	Relative Humidity	Watering	Suggested Soil Mix
2	-----			
3	50°F n, 65°F d	25% to 49%	Surface of soil mix should dry	Flowering house plants
4	65°F n, 75°F d	25% to 49%	Surface of soil mix should dry	Flowering house plants
5	65°F n, 75°F d	25% to 49%	Keep soil mix moist	African violets and other Gesneriad
6	65°F n, 75°F d	25% to 49%	Keep soil mix moist	Foliage plants
7	65°F n, 75°F d	25% to 49%	Keep soil mix moist	Foliage plants
8	65°F n, 75°F d	50% or higher	Keep soil mix moist	Ferns
9	65°F n, 75°F d	25% to 49%	Surface of soil mix should dry	Succulents and cacti
10	65°F n, 75°F d	25% to 49%	Surface of soil mix should dry	Succulents and cacti
11	65°F n, 75°F d	25% to 49%	Surface of soil mix should dry	Bromeliads
12	65°F n, 75°F d	25% to 49%	Surface of soil mix should dry	Bromeliads

# Иерархия классов



# Экземпляры классов









# Компетентные вопросы

- Растения какой группы можно выращивать при редком поливе и малом освещении?
- Какие растения дают розовые цветы?
- Какая освещенность достаточна для выращивания фикуса Бенжамина?

# Добавление объектов из баз данных

```
82 ontology = "http://www.semanticweb.org/volka/ontologies/2021/3/untitled-ontology-4#"
83 ns = MyNameSpace(g)
84 cPlant = URIRef(ontology + "plant")
85 pSun = URIRef(ontology + "sun")
86 pTemp = URIRef(ontology + "temperature")
87 pWater = URIRef(ontology + "water")
88 pSoil = URIRef(ontology + "soil")
89 pHumidity = URIRef(ontology + "humidity")
90
91 for plant, name, light, temp, hum, water, soil in data:
92     plantIndividual = URIRef(ontology + name.replace(" ", ""))
93     g.add((plantIndividual, RDF.type, cPlant))
94     g.add((plantIndividual, pSun, Literal(light)))
95     g.add((plantIndividual, pTemp, Literal(temp)))
96     g.add((plantIndividual, pWater, Literal(water)))
97     g.add((plantIndividual, pHumidity, Literal(hum)))
98     g.add((plantIndividual, pSoil, Literal(soil)))
```

# Генерация нового файла ОНТОЛОГИИ

```
:LadyslipperOrchids a :plant ;  
  :humidity "25% to 49%" ;  
  :soil "Orchids" ;  
  :sun "Over 200 ft-c, not direct sun" ;  
  :temperature "65°F n, 75°F d" ;  
  :water "Keep soil mix moist" .  
  
:LeatherPeperomia a :plant ;  
  :humidity "25% to 49%" ;  
  :soil "Foliage plants" ;  
  :sun "Over 200 ft-c, not direct sun" ;  
  :temperature "65°F n, 75°F d" ;  
  :water "Surface of soil mix should dry" .  
  
:LipstickVine a :plant ;  
  :humidity "25% to 49%" ;  
  :soil "African violets and other Gesneriads" ;  
  :sun "Over 200 ft-c, not direct sun" ;  
  :temperature "65°F n, 75°F d" ;  
  :water "Keep soil mix moist" .  
  
:LittleTreeCactus a :plant ;
```

# Экспорт новой онтологии в Protege

The screenshot displays the Protege ontology editor interface. The top menu bar includes File, Edit, View, Reasoner, Tools, Refactor, Window, and Help. The main workspace is divided into several panes:

- Class hierarchy:** Shows a tree structure starting with 'owl:Thing', branching into 'flower', 'fruits', and 'plant'. 'plant' is the selected class.
- Annotations:** Lists properties for the selected class: 'humidity' (25% to 49%), 'soil' (Foliage plants), and 'BambooPalm'.
- Direct instances:** Lists instances for the selected class, including 'Azelea', 'BabyRubberTree', 'BabyTears', 'BambooPalm', 'BelmoreSentryPalm', 'BirdsNestSansevieria', 'BirdsNestAnthurium', 'BirdsNestFern', 'Bishop'sCap', 'BlackAllegro', 'BlueFloweredTorch', 'BlueEuphorbia', 'BonsaiNatalPlum', 'BostonFern', 'BotanicalWonderPlant', 'Bougainvillea', 'BoxwoodBeauty', 'BrevitolaAloe', 'BusyLizzieImpatiens', 'ButtonFern', 'Caladium', 'CalamondinOrange', 'CandleabraPlant', 'CandlePlant', 'CapePrimrose', 'Carriwayflower', 'CastroPlant', 'ChenillePlant', 'ChineseEvergreen', 'ChineseHibiscus', 'ChristmasCactus', 'ChristmasKalaschoe', and 'KneeSoftHammock'.
- Description:** Shows the class 'plant' with its types and individuals.
- Property assertions:** Lists assertions for the selected class, including 'sun' (75 ft.c to 200 ft.c), 'water' (Surface of soil mix should dry), and 'temperature' (65°F to 75°F).

The bottom status bar indicates the current reasoner is set to 'Select a reasoner from the Reasoner menu' and shows the date and time: 13:38 24.04.2021.



# SPARQL

Какие растения можно выращивать в тени, без поступления прямого солнечного света?

```
select *  
where { ?individuals rdf:type ?plant .}  
filter (owl:topDataProperty:sun = \"Over 200 ft-c, not direct sun\") .
```

# Добавление VoID описания

```
40
41 <http://www.semanticweb.org/volka/ontologies/2021/3/untitled-ontology-4#\_class0> a ns1:Dataset ;
42   ns1:class <http://www.semanticweb.org/volka/ontologies/2021/3/untitled-ontology-4#plant> ;
43   ns1:classes 1 ;
44   ns1:distinctObjects 20 ;
45   ns1:distinctSubjects 228 ;
46   ns1:entities 228 ;
47   ns1:properties 6 ;
48   ns1:triples 1370 .
49
50 <http://www.semanticweb.org/volka/ontologies/2021/3/untitled-ontology-4#\_class1> a ns1:Dataset ;
51   ns1:class <http://www.w3.org/2002/07/owl#Restriction> ;
52   ns1:classes 1 ;
53   ns1:distinctObjects 6 ;
54   ns1:distinctSubjects 6 ;
55   ns1:entities 6 ;
56   ns1:properties 3 ;
57   ns1:triples 18 .
58
59 <http://www.semanticweb.org/volka/ontologies/2021/3/untitled-ontology-4#\_class2> a ns1:Dataset ;
60   ns1:class <http://www.w3.org/2002/07/owl#Class> ;
61   ns1:classes 1 ;
62   ns1:distinctObjects 5 ;
63   ns1:distinctSubjects 11 ;
64   ns1:triples 44 .
```

# SHACL shape

## Shapes Graph

```

schema:PlantShape
  a sh:NodeShape ;
  sh:targetClass schema:Plant ;
  sh:property [
    sh:path schema:name ;
    sh:datatype xsd:string ;
    sh:name "regular name" ;
  ] ;
  sh:property [
    sh:path schema:props ;
    sh:node schema:propertyShape ;
  ] .

schema:propertyShape
  a sh:NodeShape ;
  sh:closed true ;
  sh:property [
    sh:path schema:sun ;
    sh:datatype xsd:string ;
    sh:sun "option" ;
  ] ;
  sh:property [
    sh:path schema:humidity ;
    sh:datatype xsd:string ;
  ] .

```

## Data Graph

Example Data in JSON-LD Format ▾

```

{
  "@context": { "@vocab": "http://schema.org/" },
  "@id":
"http://www.semanticweb.org/volka/ontologies/2021/3/untitled-ontology-4",
  "@type": "Plant",
  "name": "AfricanViolets",
  "props": {
    "@id":
"http://example.org/http://www.semanticweb.org/volka/ontologies/2021/3/untitled-ontology-4#AfricanViolets_properties",
    "sun": "Over 200 ft-c, not direct sun",
    "humidity": "25% to 49%",
    "temperature": 65
  }
}

```

Update

Format: Turtle ▾

Always included: [shacl.ttl](#) [dash.ttl](#)

Parsing took 80 ms. Preparing the shapes took 5 ms. Validation the data took 6 ms.

Update

Format: JSON-LD ▾

Parsing took 6 ms. Validating the data took 6 ms.

# Документация проекта (Widoco)

Файл | C:/Users/volka/Downloads/myDocumentation/index-en.html

[Table 1: Namespaces used in the document](#)

<b>[Ontology NS Prefix]</b>	<http://www.semanticweb.org/volka/ontologies/2021/3/untitled-ontology-4>
<b>3</b>	<http://www.semanticweb.org/volka/ontologies/2021/3>
<b>owl</b>	<http://www.w3.org/2002/07/owl>
<b>rdf</b>	<http://www.w3.org/1999/02/22-rdf-syntax-ns>
<b>xsd</b>	<http://www.w3.org/2001/XMLSchema>
<b>rdfs</b>	<http://www.w3.org/2000/01/rdf-schema>

[back to ToC](#)

## 2. [Ontology Name]: Overview

This ontology has the following classes and properties.

**Classes**

[blooming](#) [cactus](#) [foliage](#) [fruits](#) [house plant](#) [mini tree](#) [succulent](#) [with fruits](#) [without fruits](#)

**Object Properties**

[produce](#) [rise](#)





# Сложности в процессе работы

- Поиск и подготовка к использованию данных:  
объединение данных из разных источников,  
дополнение недостающих частей  
информации.

# Спасибо за внимание!

[www.ifmo.ru](http://www.ifmo.ru)

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