

USING THE ONTOLOGY FOR CREATING KNOWLEDGE BASE OF THE EXPERT SYSTEM OF THE SUBJECT AREA OF THE STORING OF VEGETABLES AND FRUITS BY THE TECHNOLOGY «ULO»

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ABSTRACT

Using the ontology for creating the knowledge base of the expert system of the subject area of the storing of vegetables and fruits by the technology «ULO» is reviewed in this article. The expert system, which will be created with CLIPS language, will be used for manage of the automation system of the warehouses for the storing of vegetables and fruits by the technology «ULO».

Keywords: ontology, technology «ULO», expert system, CLIPS.

The ontology of the subject area of the storing of vegetables and fruits by the technology «ULO», which was created [1], is describing the conditions of the storing of vegetables and fruits in the warehouses. These conditions include value of temperature and humidity of the air in the warehouses, also the percentage of O₂ and CO₂ in the air and optimal terms storing of vegetables and fruits in the warehouses.

Using the software Protégé, when the ontology was creating, and using the CLIPS Tab plug-in is permitted to describe this ontology with using the language of expert system – CLIPS for creating the knowledge base of the expert system.

Describing the class **Orange** with using the language CLIPS is presented in the Figure 1.

```

(defclass MAIN::Orange
  (is-a Fruits)
  (role concrete)
  (pattern-match reactive)
  (single-slot Days
    (type INTEGER)
    (default 84)
    (visibility public)
    (create-accessor read-write))
  (single-slot Name
    (type STRING)
    (default "orange")
    (visibility public)
    (create-accessor read-write))
  (multislot CO2
    (type FLOAT)
    (default 2.5 2.5)
    (visibility public)
    (create-accessor read-write))
  (multislot Temp
    (type FLOAT)
    (default 0.0 9.0)
    (visibility public)
    (create-accessor read-write))
  (multislot Hum
    (type FLOAT)
    (default 85.0 90.0)
    (visibility public)
    (create-accessor read-write))
  (multislot O2
    (type FLOAT)
    (default 5.0 10.0)
    (visibility public)
    (create-accessor read-write)))

```

Figure 1. Describing the class **Orange** with using the language CLIPS.

The rules, which will be using for functioning of the expert system, is creating with using the knowledge base of the expert system. Describing the separate rules, which were created with using the language CLIPS, is presented in the Figure 2.

```

(defrule Orange
  (object (O2 ?o1&:(>= ?o1 5.0) ?o2&:(<= 10.0 ?o2))
   (CO2 ?co1&:(>= 2.5 ?co1) ?co2&:(<= 2.5 ?co2))
   (Hum ?h1&:(>= 85.0 ?h1) ?h2&:(<= ?h2 90.0))
   (Temp ?t1&:(>= ?t1 0.0) ?t2&:(<= 9.0 ?t2)))
=>
  (printout t "orange" crlf))

(defrule Lemon
  (object (O2 ?o1&:(>= ?o1 5.0) ?o2&:(<= 10.0 ?o2))
   (CO2 ?co1&:(>= 2.5 ?co1) ?co2&:(<= 2.5 ?co2))
   (Hum ?h1&:(>= 85.0 ?h1) ?h2&:(<= ?h2 90.0))
   (Temp ?t1&:(>= ?t1 0.0) ?t2&:(<= 9.0 ?t2)))
=>
  (printout t "lemon" crlf))

```

Figure 2. Describing the rules with using the language CLIPS.

Functioning of the expert system with using the created rules in the software CLIPS is presented in the Figure 3.

```
CLIPS 6.3 - [Dialog Window]
File Edit Buffer Execution Browse Window Help
CLIPS> (make-instance orange of Orange)
[orange]
CLIPS> (agenda)
0 Orange: [orange]
0 Lemon: [orange]
For a total of 2 activations.
CLIPS> (run)
orange
lemon
CLIPS>
```

Figure 3. Functioning of the expert system in the software CLIPS.

The two rules was be activated when the instance *orange* of the class **Orange** was be created. It was happened because the conditions of the storing lemons and oranges are similar. That is why, when rules were started, the expert system shown which kind of vegetables and fruits can be stored together. The oranges can be stored together with lemons in this case.

The creating the expert system of this type will be a possible to define which kind of vegetables and fruits can be stored together by the technology «ULO» with a certain kind, which will be entered to the expert system [2]. This expert system will be a possible to optimal the work of the warehouses and storing the different kind of vegetables and fruits by the technology «ULO» together.

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