Kingdom of Saudi Arabia

Taibah University

المملكة العربية السعودية

جامعة طيبة

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Salad Vegetables Sorter ES

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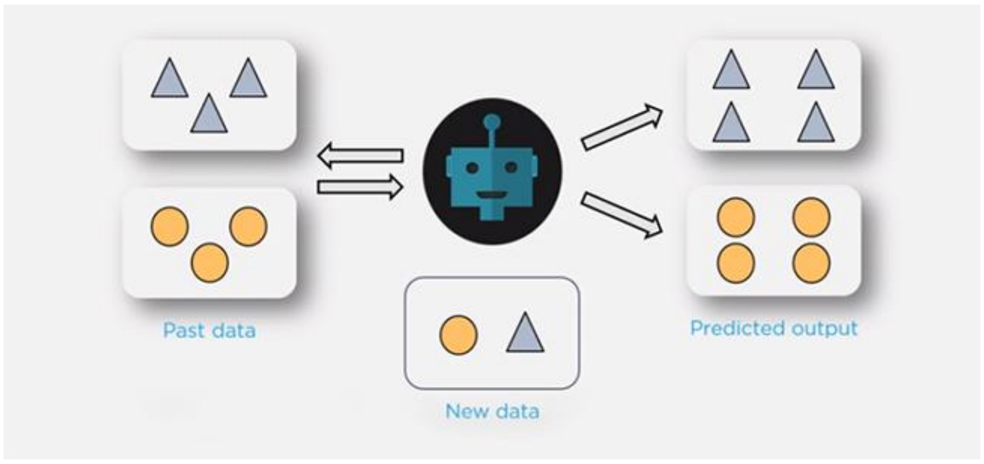
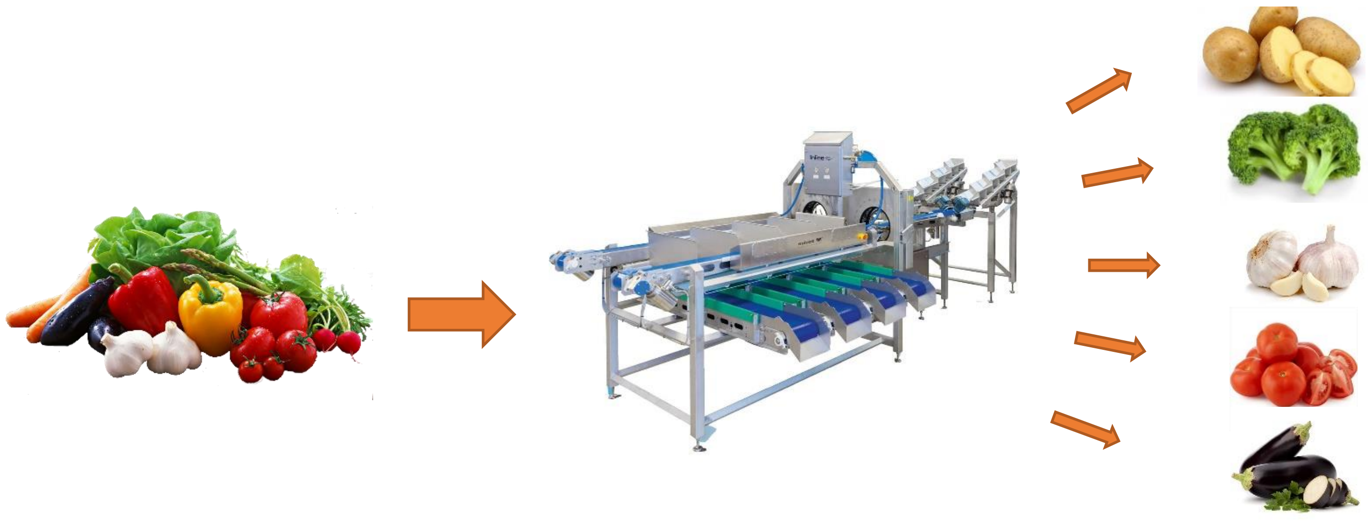
Salad Vegetables Sorter expert system

In this system, we are going to analyze and express the details of a simple expert machine system in terms of building the knowledge base based on the decision tree. Our system will only discuss the vegetables that are used in Salad because the machine is designed to help chefs in restaurant to make the different kinds of salad in an efficient way. First, we will simplify the classification using a decision tree. Then, we will write its knowledge base based on it. Finally, we will use Clips program to write codes which simulates the way our machine will work and function. We will depend on the Supervised Method. The concept of the Supervised Method is that it basically shows a model that makes predictions or decisions based on past or labeled data. Labeled data refers to sets of data that are given tags or labels, and thus made more meaningful

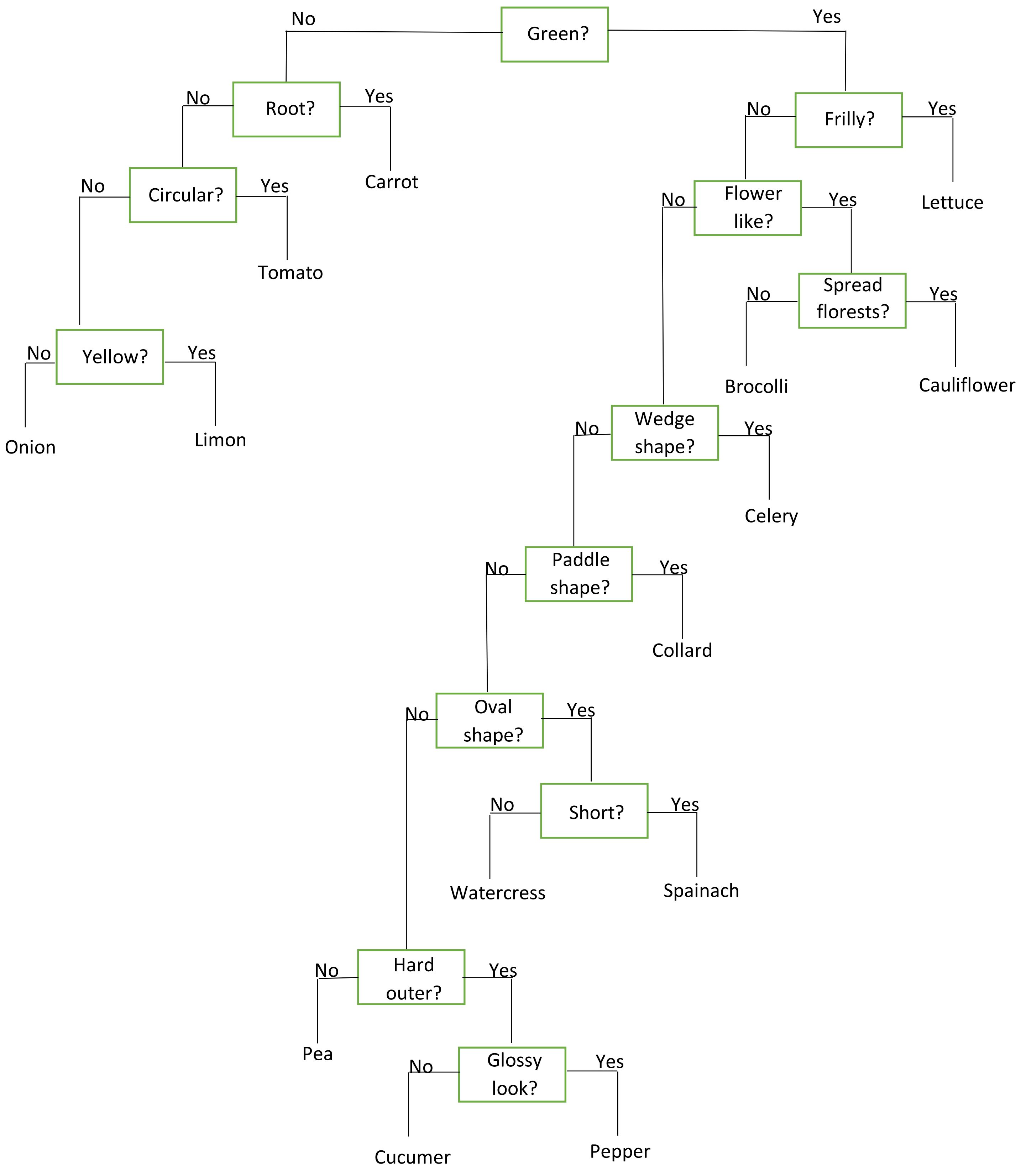


So, our system will work by copying the same idea



A **decision tree** or a **classification tree** is a tree in which each internal (non-leaf) node is labeled with an input feature. The arcs coming from a node labeled with a feature are labeled with each of the possible values of the feature. We will view the basics outputs of salad vegetables characteristics based on some criteria like shape and color

Salad Vegetables Sorter Decision Tree



Knowledge base is used to represent knowledge explicitly, rather than as procedural code. So here we used the previous tree to describe its details in a human readable language that will help us writing the codes of Clips.

Salad Vegetables Sorter knowledge base

```
deffacts knowledge-base )

goal is type.veg))

legalanswers are no yes))

***********************;;;;

rule (if green is yes) )

(then greens is green))

rule (if green is no) )

(then greens is notgreen))

question green is "Is Your Vegetable Green ?"))

***********************;;;;

rule (if greens is notgreen and  root is yes ) )

(then type.veg is Carrot))

rule (if  greens is notgreen and  root is no) )

(then  roots is noroot))

question root is "Does your Vegetable have a root ?"))

***********************;;;;

rule (if roots is noroot and circular is yes ) )

(then type.veg is Tomato))

rule (if roots is noroot and circular is no) )

(then circulars is Nocircular))

question circular is "Is Your Vegetable Circular ?"))

***********************;;;;

rule (if circulars is Nocircular  and yellow is yes ) )

(then type.veg is Lemon))

rule (if circulars is Nocircular and  yellow is no) )

(then type.veg is Onion))

question yellow is "Is Your Vegetable Color Yellow ?"))

***********************;;;;

rule (if greens is green and frilly is yes) )

(then type.veg is Lettuce ))

rule (if  greens is green and frilly is no) )
```

```
(then frillys is noFrilly))
question frilly is "Is Your Vegetable Frilly ?"))
***********************;;;;
rule (if frillys is noFrilly and flower is yes) )
(then isFlower is Flower ))
rule (if  frillys is noFrilly and flower is no) )
(then isFlower is notFlower))
question flower is "Does Your Vegetable Look Like Flower ?"))
***********************;;;;
rule (if isFlower is Flower  and spread is yes) )
(then type.veg is Cauliflower))
rule (if  isFlower is Flower  and spread is no) )
(then type.veg is Brocolli))
question  spread is "Are its Florets Spread ?"))
***********************;;;;
rule (if isFlower is notFlower  and wedgeShape is yes) )
(then type.veg is Celery))
rule (if   isFlower is notFlower  and wedgeShape is  no) )
(then wedgeShapes is notwedgeShape))
question  wedgeShape is "Does It Have Wedge Shape ?"))
***********************;;;;
rule (if  wedgeShapes is notwedgeShape and paddleShape is yes) )
(then type.veg is Collard))
rule (if  wedgeShapes is notwedgeShape and paddleShape is  no) )
(then paddleShapes is notpaddleShape))
question  paddleShape  is "Does It Have Paddle Shape ?"))
***********************;;;;
rule (if  paddleShapes is notpaddleShape and ovalShape is yes) )
(then ovalShapes is oval))
rule (if paddleShapes is notpaddleShape and ovalShape is no))
(then ovalShapes is notOval))
question  ovalShape is "Does It Have Oval Shape ?"))
***********************;;;;
rule (if ovalShapes is oval and shortVeg is yes) )
```

(then type.veg is Spinach))

rule (if ovalShapes is oval and shortVeg is no))

(then type.veg is Watercress))

question shortVeg is "IS It Short ?"))

***********************;;;;

rule (if ovalShapes is notOval and hardOuter is yes))

(then hardOuters is hard))

rule (if ovalShapes is notOval and hardOuter is no))

(then type.veg is Pea))

question hardOuter is "Is Your Vegetable Have Hard Outer ?"))

***********************;;;;

rule (if hardOuters is hard and glossy is yes))

(then type.veg is Pepper))

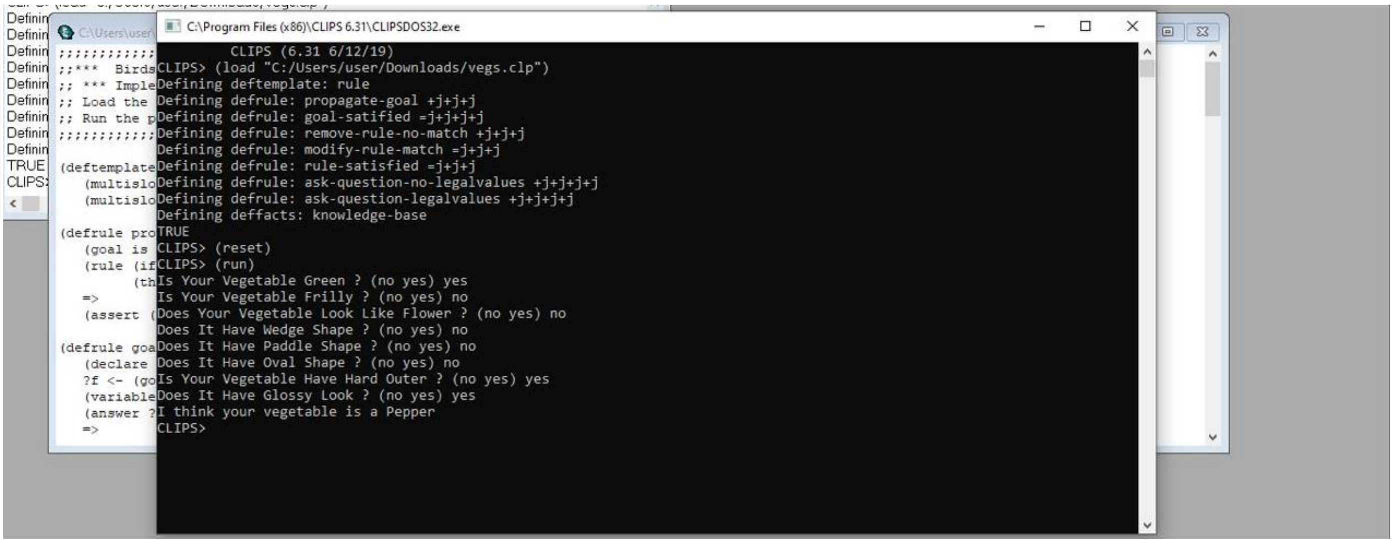
rule (if hardOuters is hard and glossy is no))

(then type.veg is Cucumber))

question glossy is "Does It Have Glossy Look ?"))

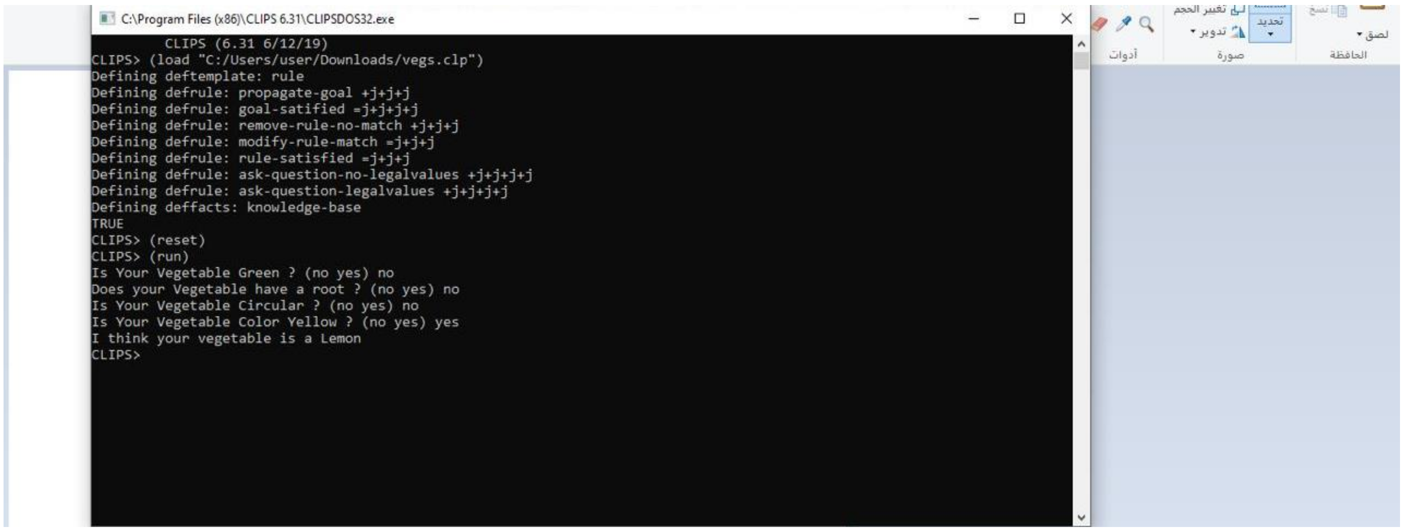
***********************;;;;

(answer is "I think your vegetable is a " type.veg))



C:\Program Files (x86)\CLIPS 6.31\CLIPSDOS32.exe

```
         CLIPS (6.31 6/12/19)
CLIPS> (load "C:/Users/user/Downloads/vegs.clp")
Defining deftemplate: rule
Defining defrule: propagate-goal +j+j+j
Defining defrule: goal-satified =j+j+j+j
Defining defrule: remove-rule-no-match +j+j+j
Defining defrule: modify-rule-match =j+j+j
Defining defrule: rule-satisfied =j+j+j
Defining defrule: ask-question-no-legalvalues +j+j+j+j
Defining defrule: ask-question-legalvalues +j+j+j+j
Defining deffacts: knowledge-base
TRUE
CLIPS> (reset)
CLIPS> (run)
Is Your Vegetable Green ? (no yes) yes
Is Your Vegetable Frilly ? (no yes) no
Does Your Vegetable Look Like Flower ? (no yes) no
Does It Have Wedge Shape ? (no yes) no
Does It Have Paddle Shape ? (no yes) no
Does It Have Oval Shape ? (no yes) no
Is Your Vegetable Have Hard Outer ? (no yes) yes
Does It Have Glossy Look ? (no yes) yes
I think your vegetable is a Pepper
CLIPS>
```



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Defining defrule: rule-satisfied =j+j+j
Defining defrule: ask-question-no-legalvalues +j+j+j+j
Defining defrule: ask-question-legalvalues +j+j+j+j
Defining deffacts: knowledge-base
TRUE
CLIPS> (reset)
CLIPS> (run)
Is Your Vegetable Green ? (no yes) no
Does your Vegetable have a root ? (no yes) no
Is Your Vegetable Circular ? (no yes) no
Is Your Vegetable Color Yellow ? (no yes) yes
I think your vegetable is a Lemon
CLIPS>
```