KG REDDY
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AN AUTONOMOUS INSTITUTION

Crop analysis and pesticides Recommendation system

Mr. Devdas - Guide

MINI PROJECT GROUP 7

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DATASETS :

1) Crop Prediction :

Crop Prediction Data, CSV file format

	Dist Code	Year	State Code	State Nam	Dist Name	RICE AREA	RICE PROD	RICE YIELD	WHEAT AR	WHEAT PR	WHEAT YI	KHARIF SO	KHARIF SO	KHARIF SO	RABI SORG	RABI SORG	RABI SORG	SORGHUM	SORGHUM	SORGHUM	PEARL MIL	PEARL MIL	PEARL MIL
2	1	1966	14	Chhattisga	Durg	548	185	337.59	44	20	454.55	0.6	0.4	666.67	0	0	0	0.6	0.4	666.67	0	0	0
3	1	1967	14	Chhattisga	Durg	547	409	747.71	50	26	520	1.1	0.9	818.18	0	0	0	1.1	0.9	818.18	0	0	0
4	1	1968	14	Chhattisga	Durg	556.3	468	841.27	53.7	30	558.66	0.5	0.4	800	0	0	0	0.5	0.4	800	0	0	0
5	1	1969	14	Chhattisga	Durg	563.4	400.8	711.4	49.4	26.5	536.44	0.8	0.6	750	0	0	0	0.8	0.6	750	0	0	0
6	1	1970	14	Chhattisga	Durg	571.6	473.6	828.55	44.2	29	656.11	0.9	0.6	666.67	0	0	0	0.9	0.6	666.67	0	0	0
7	1	1971	14	Chhattisga	Durg	581.8	412.9	709.69	44.4	25.8	581.08	0.3	0.2	666.67	0	0	0	0.3	0.2	666.67	0	0	0
8	1	1972	14	Chhattisga	Durg	582.2	381	654.41	39.6	20.6	520.2	0.3	0.3	1000	0	0	0	0.3	0.3	1000	0	0	0
9	1	1973	14	Chhattisga	Durg	600	471.9	786.5	37.3	18.6	498.66	0.2	0.2	1000	0	0	0	0.2	0.2	1000	0	0	0
10	1	1974	14	Chhattisga	Durg	587.4	219	372.83	36.5	22.4	613.7	0.5	0.4	800	0	0	0	0.5	0.4	800	0	0	0
11	1	1975	14	Chhattisga	Durg	598.3	454	758.82	49.2	27.8	565.04	0.2	0.2	1000	0	0	0	0.2	0.2	1000	0	0	0
12	1	1976	14	Chhattisga	Durg	593.6	327.1	551.04	46.9	10	213.22	0.1	0.1	1000	0	0	0	0.1	0.1	1000	0	0	0
13	1	1977	14	Chhattisga	Durg	600.7	572.4	952.89	53.1	27.1	510.36	0.1	0.1	1000	0	0	0	0.1	0.1	1000	0	0	0
14	1	1978	14	Chhattisga	Durg	612.5	362.2	591.35	48.7	25.6	525.67	0.1	0.1	1000	0	0	0	0.1	0.1	1000	0	0	0
15	1	1979	14	Chhattisga	Durg	616.8	330.6	535.99	44.6	17.8	399.1	0.5	0.5	1000	0	0	0	0.5	0.5	1000	0	0	0
16	1	1980	14	Chhattisga	Durg	634.9	515.6	812.1	44.1	33.6	761.9	0.2	0.2	1000	0	0	0	0.2	0.2	1000	0	0	0
17	1	1981	14	Chhattisga	Durg	630	506.9	804.6	41.5	23.6	568.67	0.2	0.2	1000	0	0	0	0.2	0.2	1000	0	0	0
18	1	1982	14	Chhattisga	Durg	627.9	513.3	817.49	41.1	23.9	581.51	0.1	0.1	1000	0	0	0	0.1	0.1	1000	0	0	0
19	1	1983	14	Chhattisga	Durg	626.7	711	1134.51	39.9	20.6	516.29	0.1	0.1	1000	0	0	0	0.1	0.1	1000	0	0	0
20	1	1984	14	Chhattisga	Durg	632.2	563.8	891.81	40.5	19.9	491.36	0.3	0.3	1000	0	0	0	0.3	0.3	1000	0	0	0
21	1	1985	14	Chhattisga	Durg	630.8	699.8	1109.38	39.4	21	532.99	0.3	0.2	666.67	0	0	0	0.3	0.2	666.67	0	0	0
22	1	1986	14	Chhattisga	Durg	643	525	816.49	37	24	648.65	0.2	0.1	500	0	0	0	0.2	0.1	500	0	0	0
23	1	1987	14	Chhattisga	Durg	648	523	807.1	43	23	534.88	0.3	0.2	666.67	0	0	0	0.3	0.2	666.67	0	0	0
24	1	1988	14	Chhattisga	Durg	652.7	549.7	842.19	43.7	20.2	462.24	0.1	0.1	1000	0	0	0	0.1	0.1	1000	0	0	0
25	1	1989	14	Chhattisga	Durg	660.2	457.3	692.67	43.8	22.7	518.26	0.1	0.1	1000	0	0	0	0.1	0.1	1000	0	0	0
26	1	1990	14	Chhattisga	Durg	682.9	806.8	1181.43	36.2	24.8	685.08	0.5	0.4	800	0	0	0	0.5	0.4	800	0	0	0
27	1	1991	14	Chhattisga	Durg	680.8	773.6	1136.31	34.8	21.6	620.69	2.3	1.8	782.61	0	0	0	2.3	1.8	782.61	0	0	0

Crop Prediction Data

DATASETS :

2) Crop Disease Classification :

Crop Disease Classification Data, CSV file format

DATASETS :

3) Crop Clustering :

In crop clustering, we use data that we have extracted from the crop disease classification.

DATASETS :

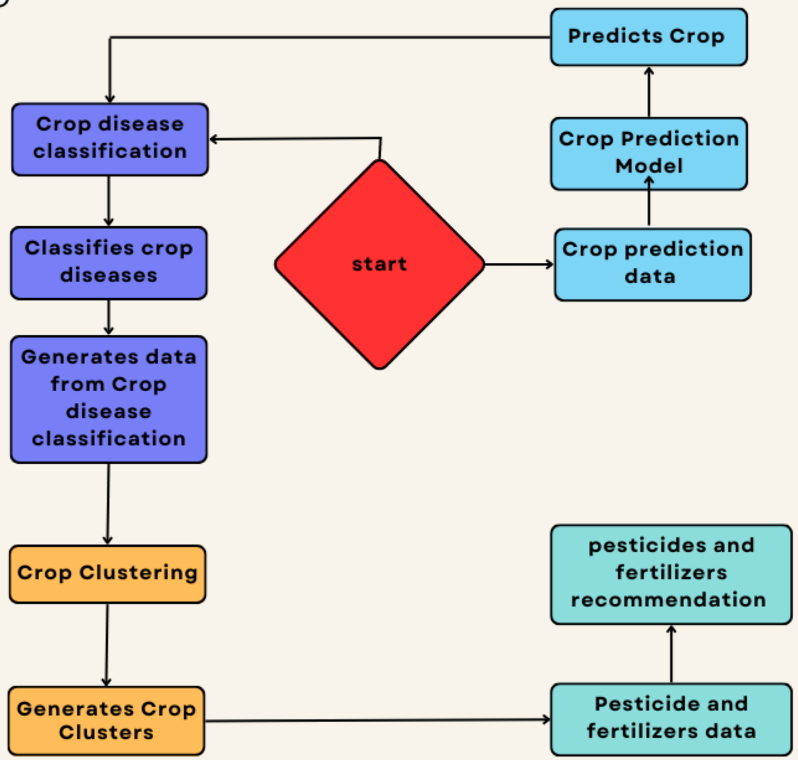
4) Pesticides and Fertilizers Recommendation:

P&F Data, CSV file format

1	Entity	Code	Year	Nutrient
2	Afghanistan	AFG	1961	0.13
3	Afghanistan	AFG	1962	0.13
4	Afghanistan	AFG	1963	0.13
5	Afghanistan	AFG	1964	0.13
6	Afghanistan	AFG	1965	0.13
7	Afghanistan	AFG	1966	0.13
8	Afghanistan	AFG	1967	1.13
9	Afghanistan	AFG	1968	1.75
10	Afghanistan	AFG	1969	1.88
11	Afghanistan	AFG	1970	2
12	Afghanistan	AFG	1971	1.84
13	Afghanistan	AFG	1972	1.99
14	Afghanistan	AFG	1973	2.2
15	Afghanistan	AFG	1974	3.01
16	Afghanistan	AFG	1975	3.44
17	Afghanistan	AFG	1976	3.81
18	Afghanistan	AFG	1977	4.6
19	Afghanistan	AFG	1978	4.41
20	Afghanistan	AFG	1979	4.13

1	Entity	Code	Year	Pesticides (to
2	Africa (FAO)		1990	65944.26
3	Africa (FAO)		1991	62723.2
4	Africa (FAO)		1992	54428.07
5	Africa (FAO)		1993	49620.53
6	Africa (FAO)		1994	51095.37
7	Africa (FAO)		1995	56939.78
8	Africa (FAO)		1996	58563.56
9	Africa (FAO)		1997	59473.66
10	Africa (FAO)		1998	60770.25
11	Africa (FAO)		1999	63027.14
12	Africa (FAO)		2000	63894.15
13	Africa (FAO)		2001	64523.1
14	Africa (FAO)		2002	67516.16
15	Africa (FAO)		2003	69697.31
16	Africa (FAO)		2004	73268.59
17	Africa (FAO)		2005	71312.94
18	Africa (FAO)		2006	77401.08
19	Africa (FAO)		2007	75657.45
20	Africa (FAO)		2008	79274.89

Project Flow



MODULES:

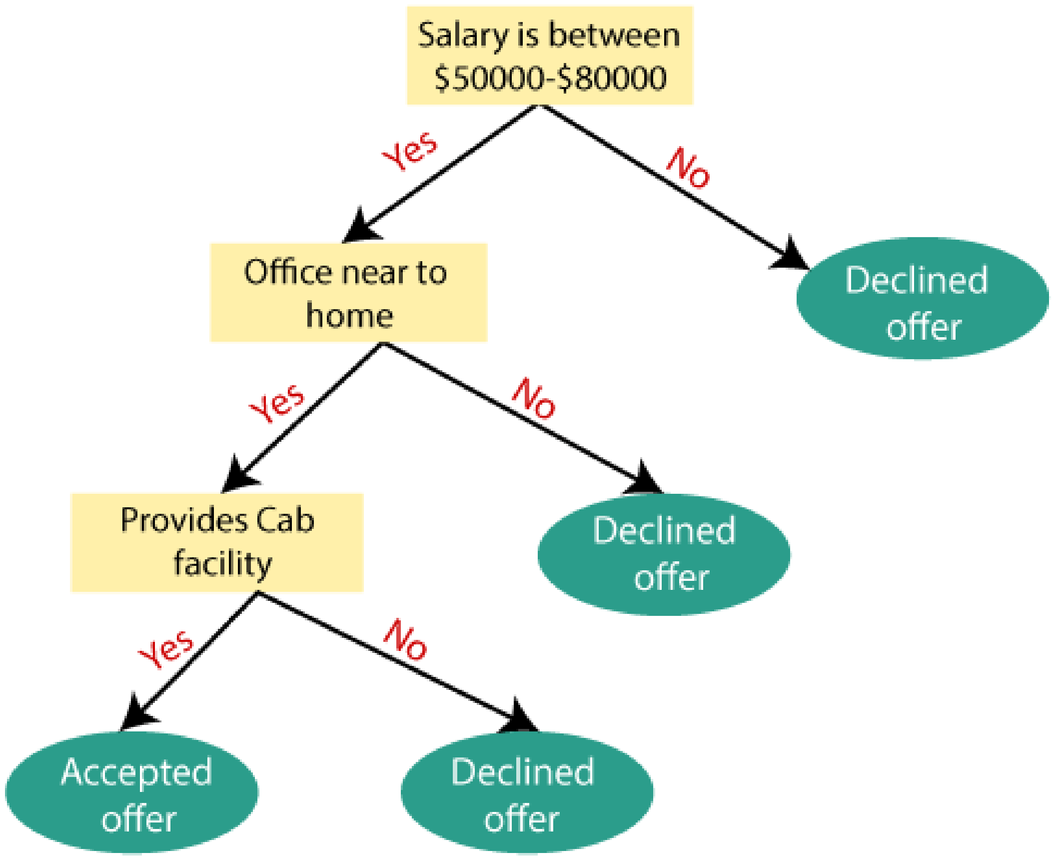
1) Crop Prediction :

1) Decision Tree

- **Step-1:** Begin the tree with the root node, says S, which contains the complete dataset.
- **Step-2:** Find the best attribute in the dataset using **Attribute Selection Measure (ASM).**
- **Step-3:** Divide the S into subsets that contains possible values for the best attributes.
- **Step-4:** Generate the decision tree node, which contains the best attribute.
- **Step-5:** Recursively make new decision trees using the subsets of the dataset created in step -3. Continue this process until a stage is reached where you cannot further classify the nodes and called the final node as a leaf node.

Example

1) Suppose there is a candidate who has a job offer and wants to decide whether he should accept the offer or Not.
2) So, to solve this problem, the decision tree starts with the root node (Salary attribute by ASM).
3) The root node splits further into the next decision node (distance from the office) and one leaf node based on the corresponding labels.
4) The next decision node further gets split into one decision node (Cab facility) and one leaf node.
5) Finally, the decision node splits into two leaf nodes (Accepted offers and Declined offer).


Salary is between
$50000-$80000
Yes
No
Office near to
home
Declined
offer
Yes
No
Provides Cab
facility
Declined
offer
Yes
No
Accepted
offer
Declined
offer

MODULES:

1) Crop Prediction :

2) Random Forest :

Step-1: Select random K data points from the training set.

Step-2: Build the decision trees associated with the selected data points (Subsets).

Step-3: Choose the number N for decision trees that you want to build.

Step-4: Repeat Step 1 & 2.

Step-5: For new data points, find the predictions of each decision tree, and assign the new data points to the category that wins the majority votes.

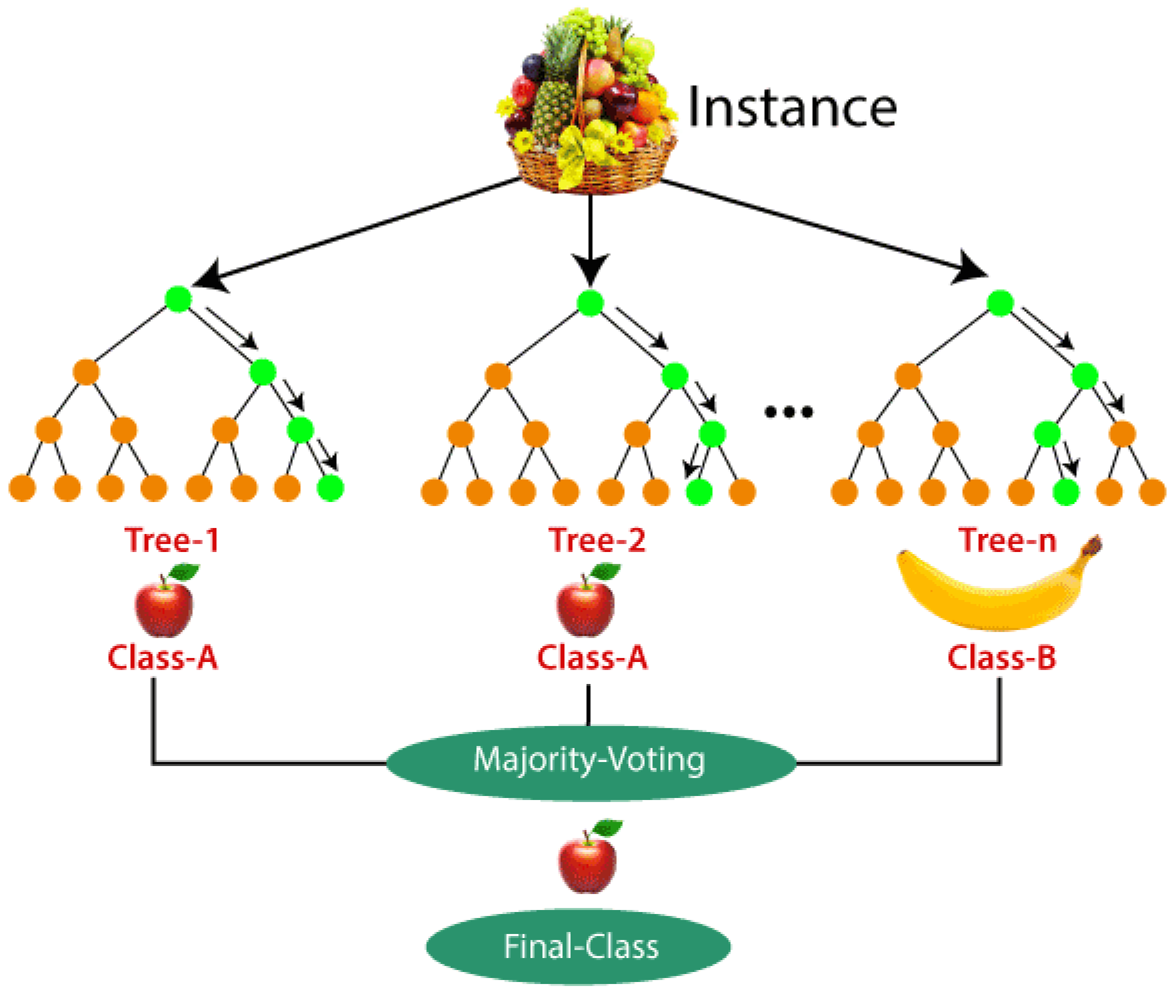
Example:

Suppose there is a dataset that contains multiple fruit images.

So, this dataset is given to the Random forest classifier. The dataset is divided into subsets and given to each decision tree.

During the training phase, each decision tree produces a prediction result

when a new data point occurs, then based on the majority of results, the Random Forest classifier predicts the final decision



Instance
Tree-1
Tree-2
Tree-n
Class-A
Class-A
Class-B
Majority-Voting
Final-Class

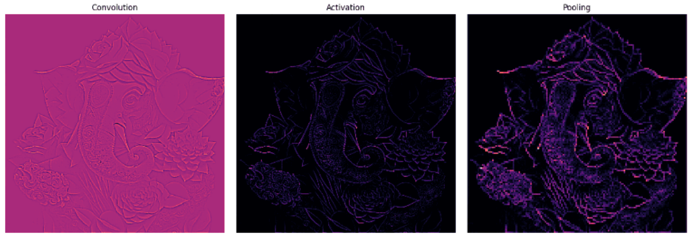
MODULES:

2) Crop disease classification :

Conventional Neural Networks:

import the necessary libraries
set the parameter
define the kernel
Load the image and plot it.
Reformat the image
Apply convolution layer operation and plot the output image.
Apply activation layer operation and plot the output image.
Apply pooling layer operation and plot the output image.

Example:



MODULES:

3) Crop Clustering:

1)K-Means Clustering :

Step-1: Select the number K to decide the number of clusters.

Step-2: Select random K points or centroids. (It can be other from the input dataset).

Step-3: Assign each data point to their closest centroid, which will form the predefined K clusters.

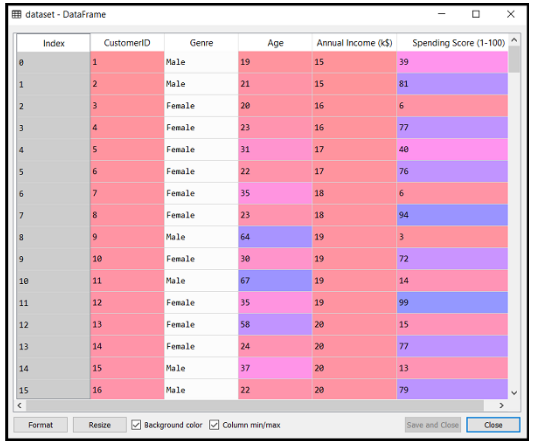
Step-4: Calculate the variance and place a new centroid of each cluster.

Step-5: Repeat the third steps, which means reassign each datapoint to the new closest centroid of each cluster.

Step-6: If any reassignment occurs, then go to step-4 else go to FINISH.

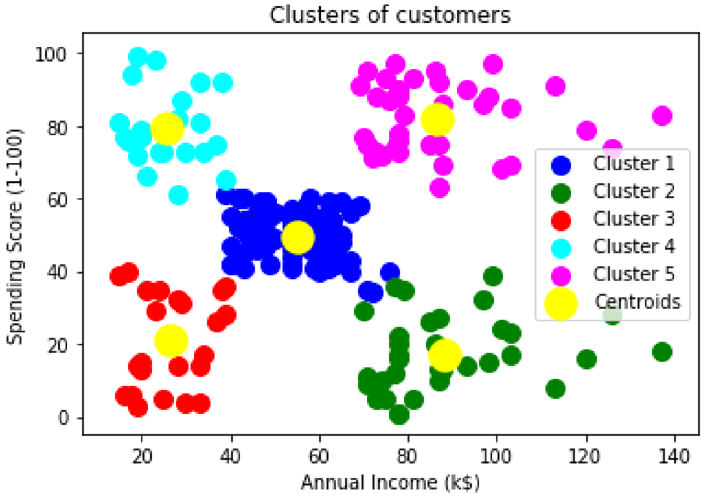
Step-7: The model is ready.

Example:


dataset - DataFrame

Index	CustomerID	Genre	Age	Annual Income (k$)	Spending Score (1-100)
0	1	Male	19	15	39
1	2	Male	21	15	81
2	3	Female	20	16	6
3	4	Female	23	16	77
4	5	Female	31	17	40
5	6	Female	22	17	76
6	7	Female	35	18	6
7	8	Female	23	18	94
8	9	Male	64	19	3
9	10	Female	30	19	72
10	11	Male	67	19	14
11	12	Female	35	19	99
12	13	Female	58	20	15
13	14	Female	24	20	77
14	15	Male	37	20	13
15	16	Male	22	20	79

Format Resize Background color Column min/max Save and Close Close



MODULES:

3) Crop Clustering:

2) Fuzzy Clustering :

Step 1: Initialize the data points into the desired number of clusters randomly.
Step 2: Find out the centroid.
Step 3: Find out the distance of each point from the centroid.
Step 4: Updating membership values.
Step 5: Repeat the steps(2-4) until the constant values are obtained for the membership values or the difference is less than the tolerance value
Step 6: Defuzzify the obtained membership values.

Example:

Cluster	(1, 3)	(2, 5)	(4, 8)	(7, 9)
1)	0.8	0.7	0.2	0.1
2)	0.2	0.3	0.8	0.9

Cluster Centers:
[[0.42363557 0.68304616]
[0.52768166 0.38180987]
[0.39967863 0.31042639]]

Cluster Membership:
[1 0 1 2 1 0 0 2 0 2 1 0 0 0 1 2 1 1 0 2 1 0 0 2 1 1 2 0 1 0 0 2 0 2 1 1 0
1 0 2 0 0 2 0 0 1 1 1 1 2 2 0 1 1 0 1 0 0 2 2 2 0 1 1 2 0 0 0 2 1 0 1 0 0
1 2 0 0 2 2 1 1 0 2 1 0 2 2 1 1 0 2 1 0 2 1 0 2 2 2 0 1 0 2]

MODULES:

4) Pesticide and Fertilizer recommendation

1) Collabarative Based filtering:

Step 1: Finding the similarity of users to the target user U.

Step 2: Prediction of missing rating of an item

Example: Consider a matrix that shows four users Alice, U1, U2 and U3 rating on different news apps. The rating range is from 1 to 5 on the basis of users' likability of the news app.
Step 1: Calculating the similarity between Alice and all the other users At first we calculate the averages of the ratings of all the user excluding I5 as it is not rated by Alice.
Step 2: Predicting the rating of the app not rated by Alice Now, we predict Alice's rating for BBC News App.

Example :

Name	Inshorts(I1)		HT(I2)	NYT(I3)	TOI(I4)
	BBC(I5)				
Alice	5	4	1	4	?
U1	3	1	2	3	3
U2	4	3	4	3	5
U3	3	3	1	5	4

Step 1:

Name	Inshorts(I1)		HT(I2)	NYT(I3)	TOI(I4)
Alice	1.5	0.5	-2.5	0.5	
U1	0.75	-1.25	-0.25	0.75	
U2	0.5	-0.5	0.5	-0.5	
U3	0	0	-2	2	

Step 2:

[Tex]r_{(Alice,I5)}=3.5 + \frac {(0.301*0.75)+(-0.33*1.5)+(0.707*1)}{|0.301|+|-0.33|+|0.707|}=3.83\newline

MODULES:

4) Pesticide and Fertilizer recommendation

2) Content Based filtering:
Content-based filtering makes recommendations by using keywords and attributes assigned to objects in a database (e.g., items in an online marketplace) and matching them to a user profile. The user profile is created based on data derived from a user's actions, such as purchases, ratings (likes and dislikes), downloads, items searched for on a website and/or placed in a cart, and clicks on product links.

Example: suppose you're recommending accessories to a user that just purchased a smartphone from your website and has previously bought smartphone accessories. Aside from keywords such as the smartphone manufacturer, make, and model, the user profile indicates prior purchases include phone holders with sleeves for credit cards. Based on this information, the recommender system may suggest similar phone holders for the new phone with attributes such as an RFID blocking fabric layer to help prevent unauthorized credit card scanning. In this example, the user would expect recommendations for similar phone holders, but the RFID blocking feature may be something they didn't expect yet appreciate.

Thank You