

Palm Care

Palm Tree Disease Detection
using Image Processing and AI



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Problem




- Red Palm Weevil
- Leaf Blight
- Leaf Spot



Problem

TOP 10 LARGEST DATE PRODUCERS IN THE WORLD

Rank	Country	Production (1000 Metric Tonnes)
1.	Egypt	1,373.57
2.	Saudi Arabia	1,122.82
3.	Iran	1,016.61
4.	United Arab Emirates	900.00
5.	Algeria	690.00
6.	Iraq	619.18
7.	Pakistan	557.28
8.	Oman	268.01
9.	Tunisia	180.00
10	Libya	165.95

Survey Paper Submission

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Current status: Under Review ⓘ (02/Jan/2020)	Associate Editor: Ghulam Muhammad
	Article Type: Review Article
	Initial submission : 06/Dec/2019

Survey Paper Submission

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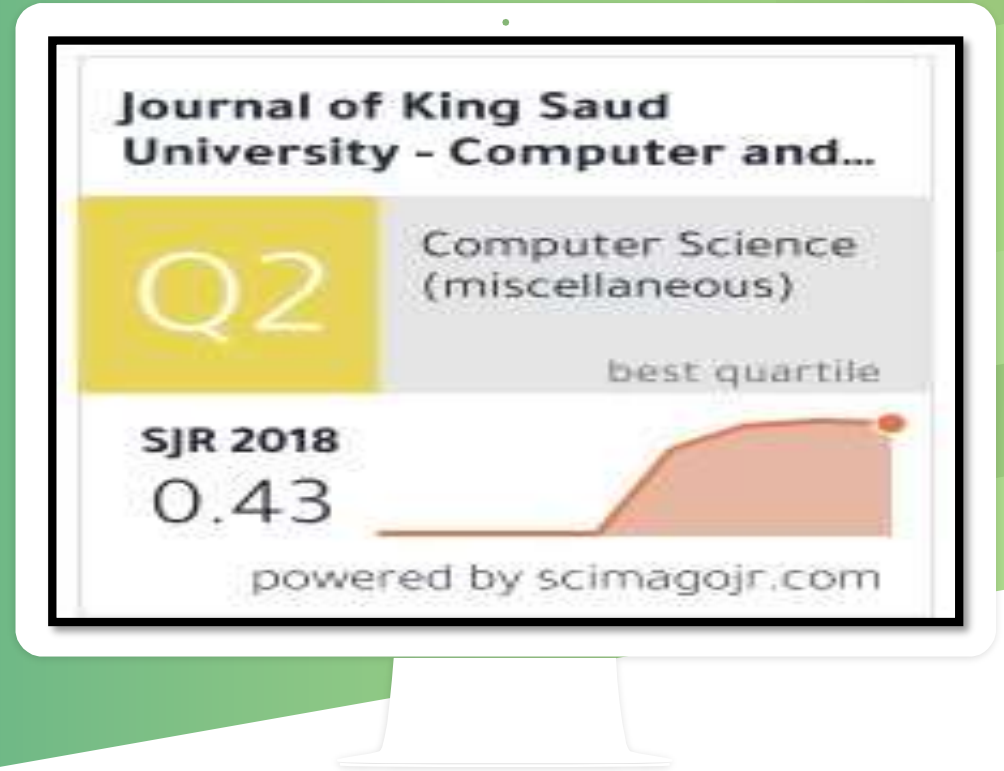
Coverage 2015-ongoing

Scope The Journal of King Saud University Computer and Information Sciences is a refereed, international journal that covers all aspects of both foundations of computer and its practical

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H Index

Survey Paper Submission

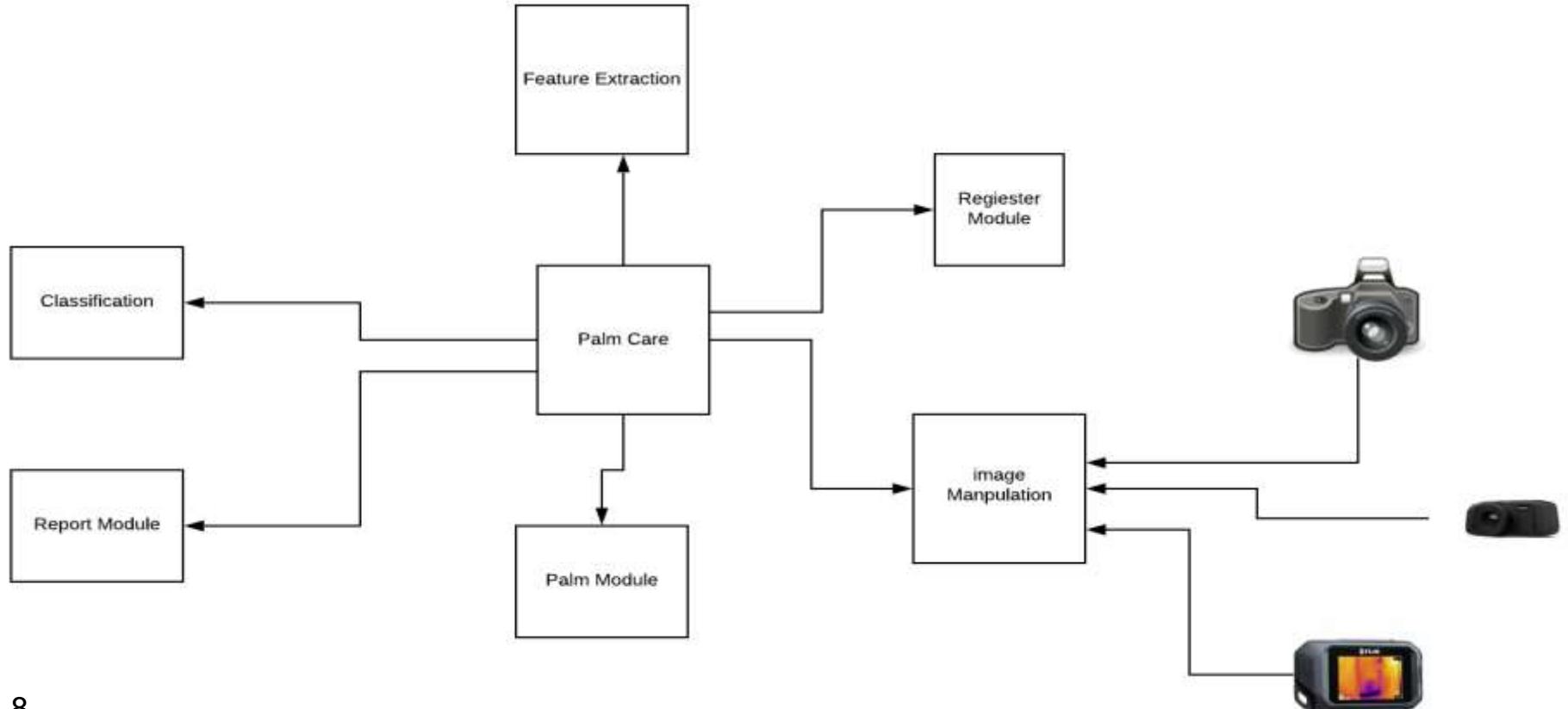


Objective

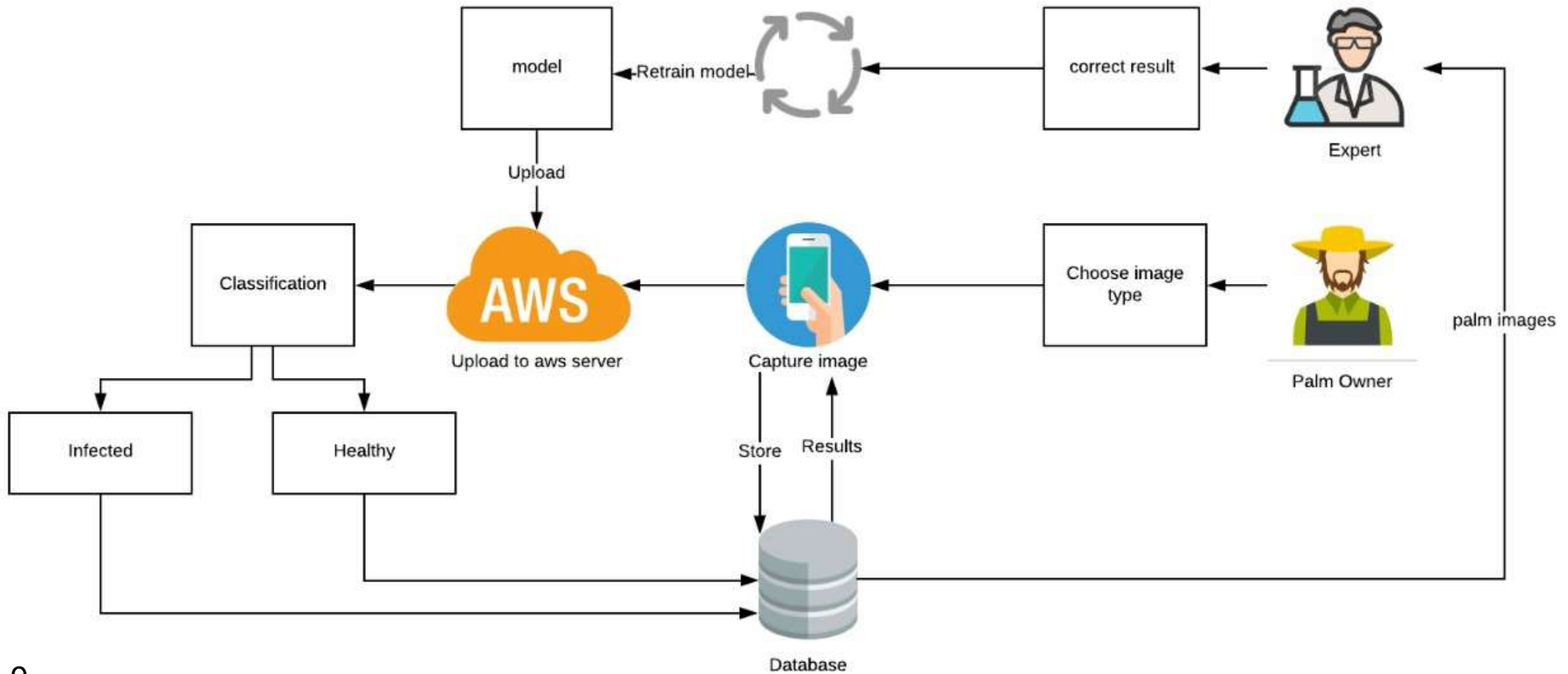
Early detection of palm trees' **common diseases**, such as **leaf blight and leaf spots** that affects the palm leaves as well as a lethal pest called **red palm weevil**.

This is done through a mobile application by acquiring palm images with different types of cameras, applying enhancements to the images then classifying them using deep learning techniques.

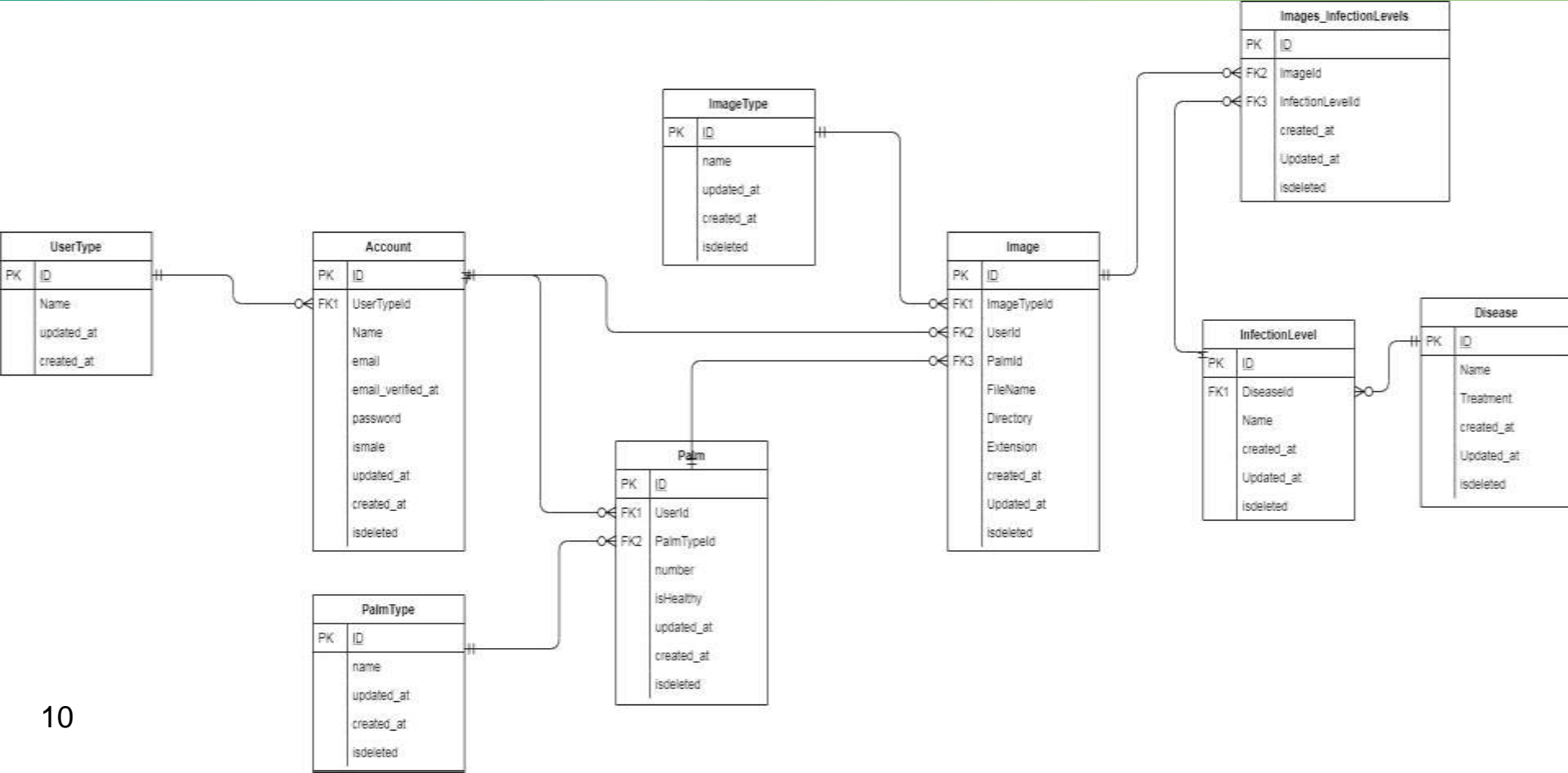
Context Diagram



Business Context Diagram

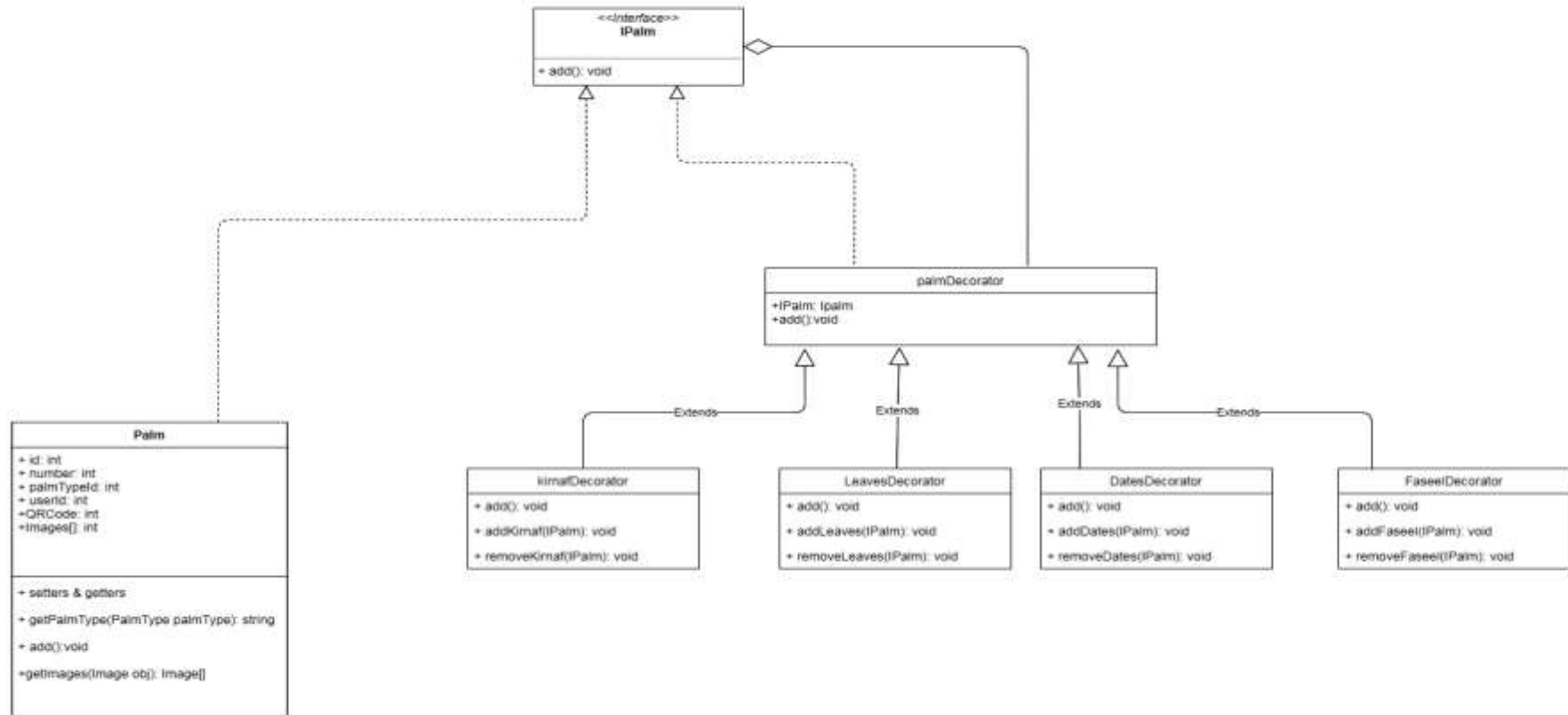


Database Diagram

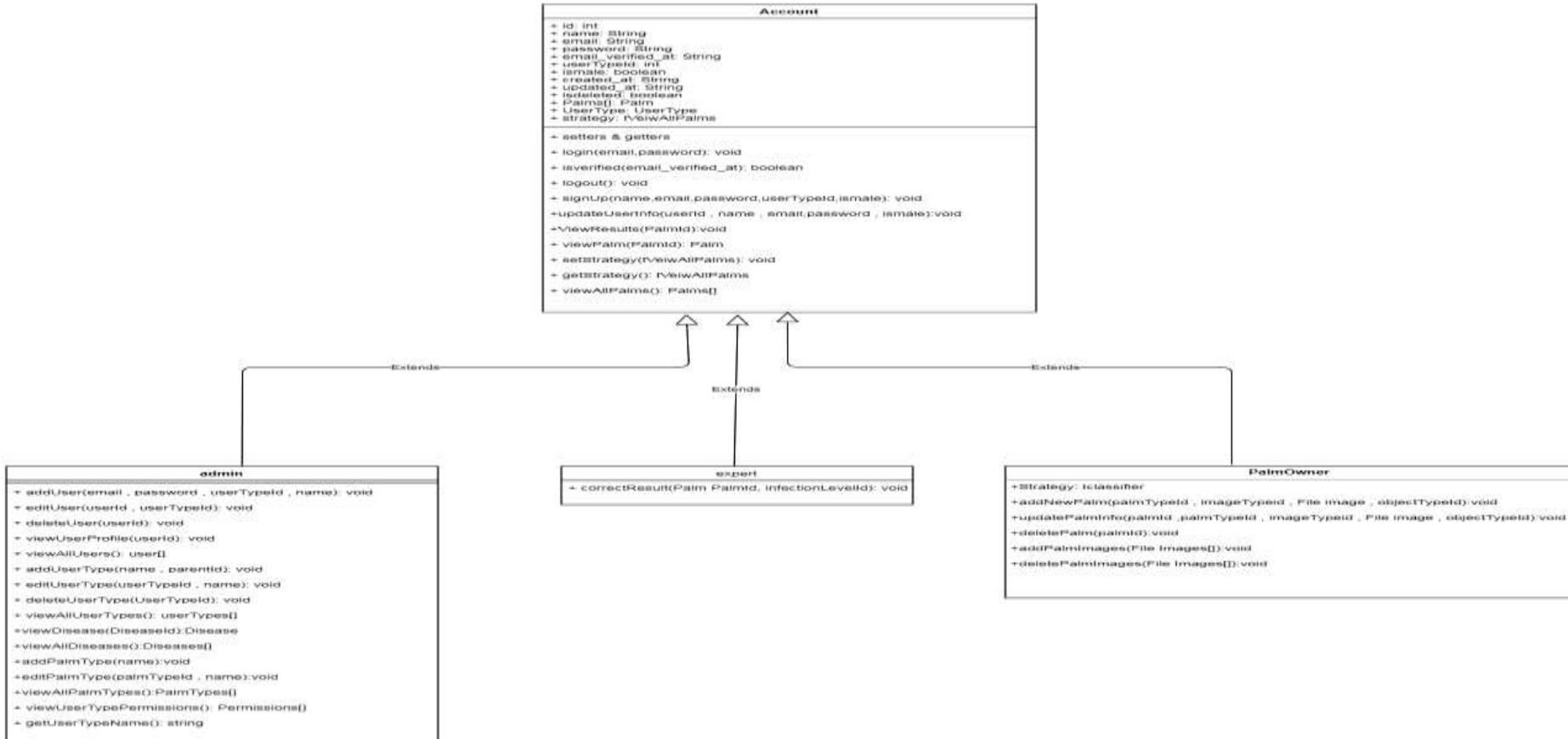


Class Diagram 2/6

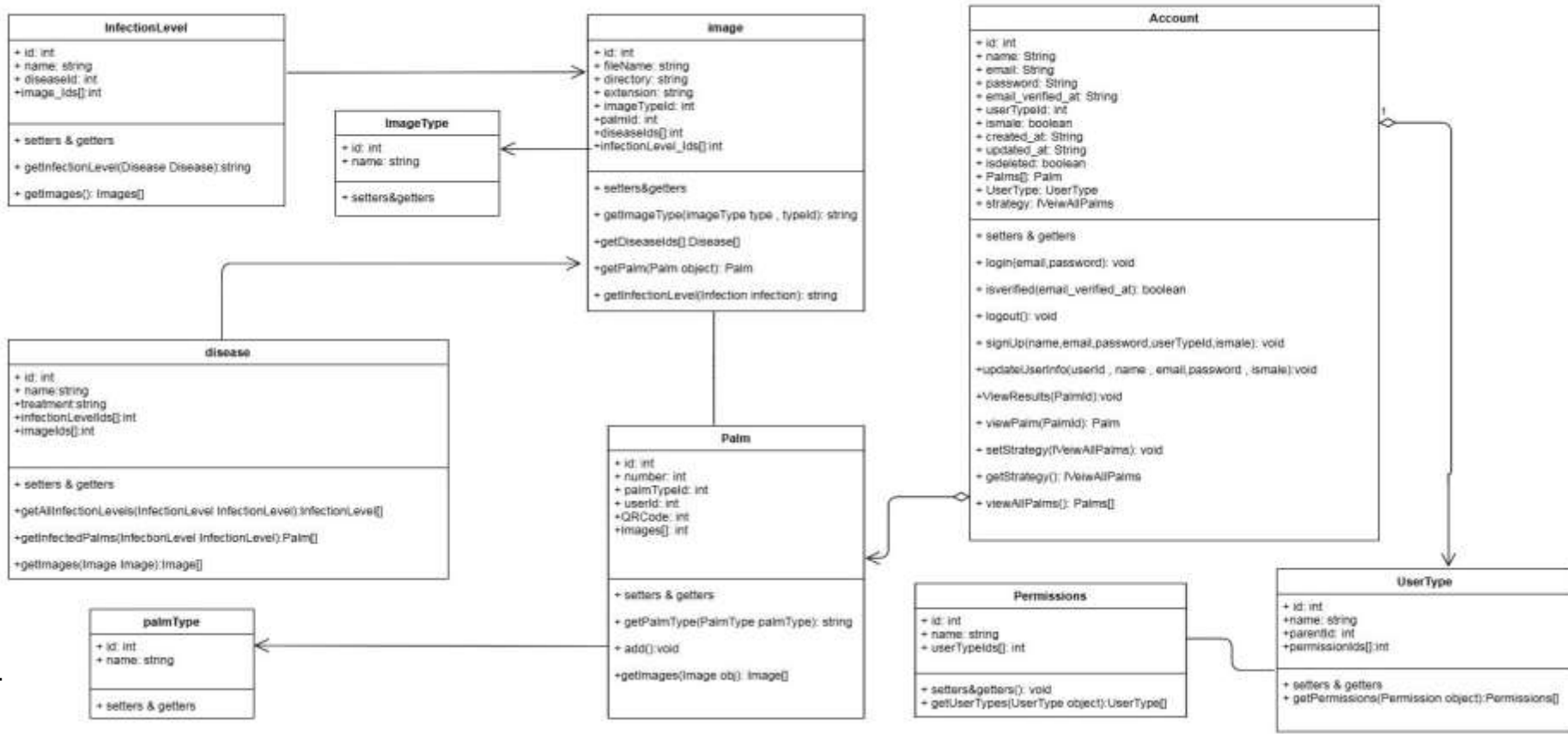
Decorator Design Pattern



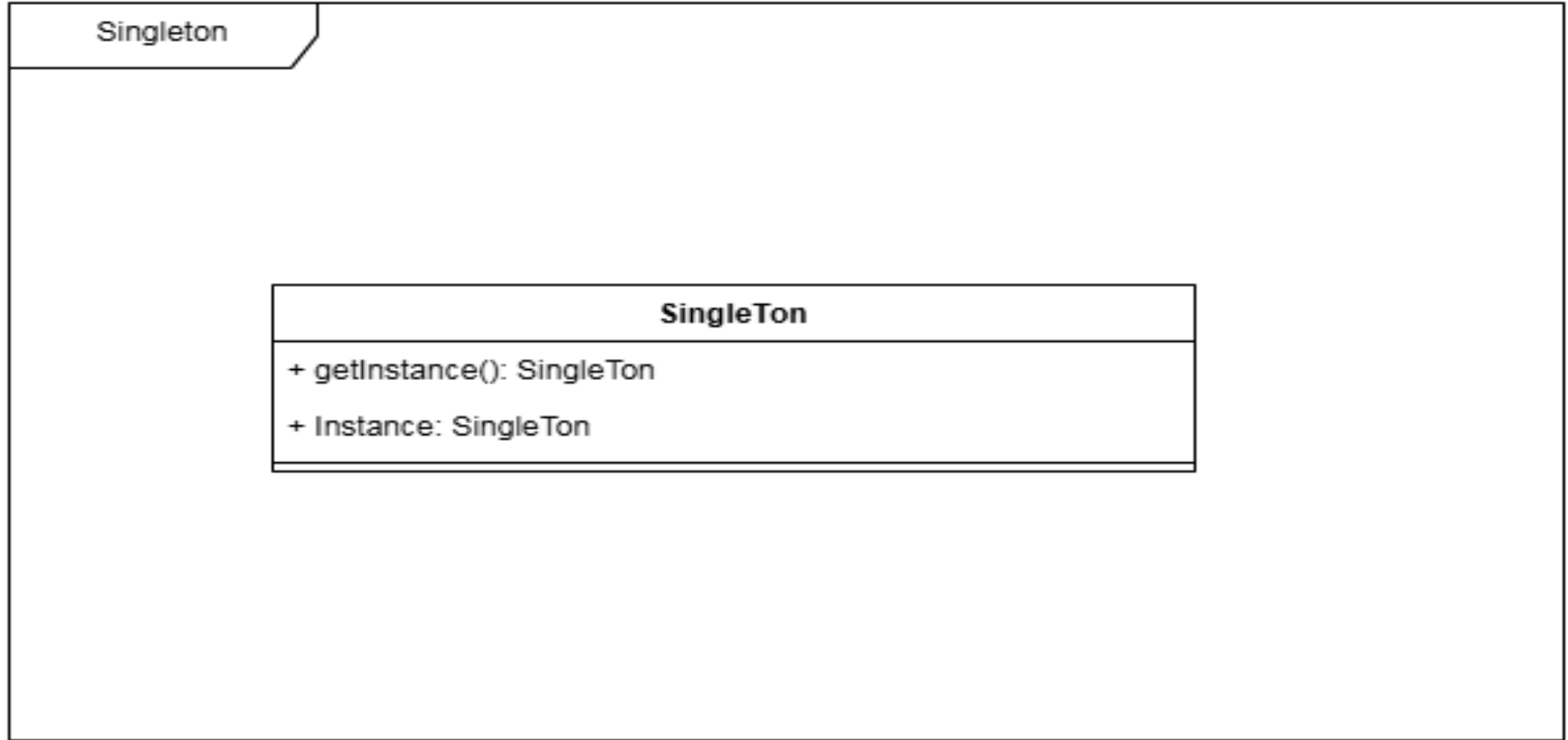
Class Diagram 3/6



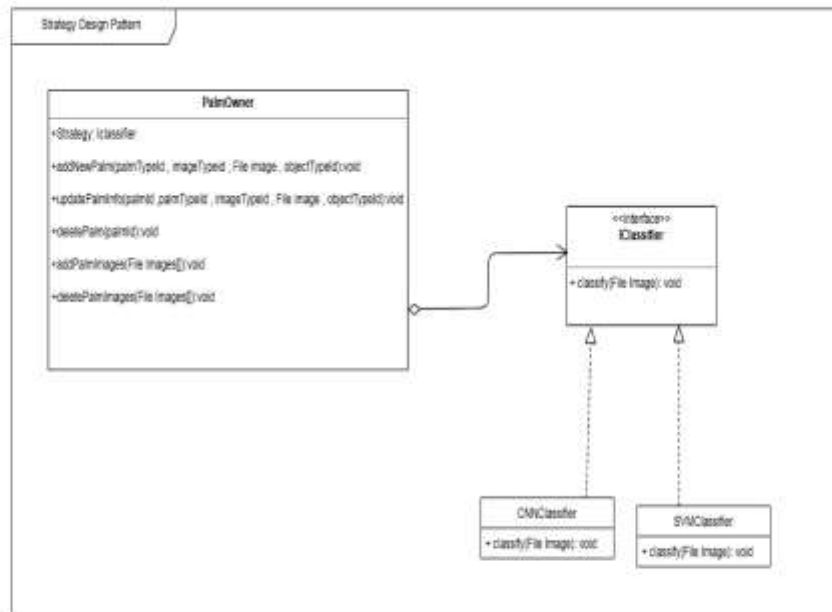
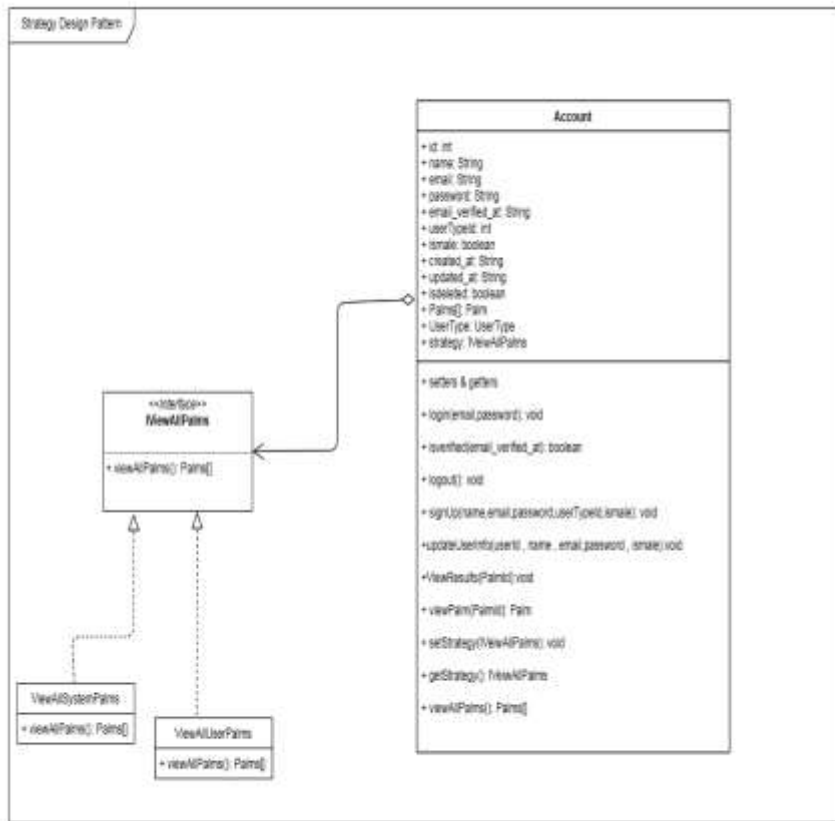
Class Diagram 4/6



Class Diagram 5/6



Class Diagram 6/6



Functional Requirements 1/4

ID	CNN
Title	Classify
Description	Classify image using CNN Model
Input	Image file
Action	executing CNN trained model.
Output	None
Pre-Condition	<ol style="list-style-type: none">1.User must have an authenticated account.2.User Device must be connected to the Internet.3.Server must be connected to the Firebase.4.Palm Data must be already existed in the Firebase.5.server must be connected to the AWS.
Post Condition	None.

Functional Requirements 2/4

ID	SVM
Title	Classify
Description	Classify image using SVM Model
Input	Image file
Action	executing SVM trained model.
Output	None
Pre-Condition	<ol style="list-style-type: none">1.User must have an authenticated account2.User Device must be connected to the Internet.3.Server must be connected to the Firebase.4.Palm Data must be already existed in the Firebase.5.server must be connected to the AWS.
Post Condition	None.

Functional Requirements 3/4

ID	PO4
Title	addPalmImages
Description	Palm Owner can add an array of images added to the palm data
Input	File Images[]
Action	Palm owner press add button and upload the images he selects
Output	Status Message
Pre-Condition	<ol style="list-style-type: none">1.Palm Owner must have an authenticated account2.Palm Owner Device must be connected to the Internet3.Server must be connected to the Firebase
Post Condition	<ol style="list-style-type: none">1.Palm new images are inserted in the Firebase2.Palm new images are sent to AWS

Functional Requirements 4/4

ID	AC6
Title	ViewResults
Description	View the palm classification results.
Input	PalmId
Action	the function executes the classification saved results in database.
Output	Array of Objects
Pre-Condition	<ol style="list-style-type: none">1.User must have an authenticated account.2.User must previously register an account in the system.3.User Device must be connected to the Internet.4.Server must be connected to the Firebase.
Post Condition	user can view the palm results.

Non Functional Requirements



Security

- Hashing
- Authentication
- Created at, Deleted at, Updated at.



Maintainability

- MVC
- Single Tone
- Decorator
- Strategy



Usability

- User Friendly
- Multilinguistic
- Design Sequential
- Nelson usability heuristics



Reliability

- Firebase
- Amazon web Service



Utilization and Resource

Computations take place on the server not on the smartphones

Demo

Jupyter Healthy_CNN_70_30_Small_Kernel_3_3 Last Checkpoint: 5 minutes ago (unsaved changes)



Logout

File Edit View Insert Cell Kernel Widgets Help

Trusted

Python 3

Run

```
print("Acc_Score:", acc_score)
print("F_Score:", f_score*100)
print("Recall:", recall*100)

for i in range(1,7):
    # for i in range(1,4):
    #     img1 = load_img('blight'+str(i)+'.jpg', target_size=(200, 200))
    img1 = load_img('brown spots test/B ('+str(i)+').jpg', target_size=(200, 200))
    #     img1 = load_img('healthy test/H ('+str(i)+').jpg', target_size=(200, 200))
    img = img_to_array(img1)
    # img = img/255
    # create a batch of size 1 [N,H,W,C]
    img = np.expand_dims(img, axis=0)
    prediction = classifier.predict(img, batch_size=None, steps=1) #gives all class prob.
    if(prediction[:, :]>0.5):
        value = 'Healthy :%1.2f'%(prediction[0,0])
        plt.text(20, 62, value, color='red', fontsize=18, bbox=dict(facecolor='white', alpha=0.8))
    else:
        value = 'Brown :%1.2f'%(1.0-prediction[0,0])
        plt.text(20, 62, value, color='red', fontsize=18, bbox=dict(facecolor='white', alpha=0.8))

plt.imshow(img1)
plt.show()
```

Stakeholders

- Agriculture of Suez Canal University
- Agriculture of Ain shams University
- Palm Research Institute
- National Authority for Remote Sensing and Space Sciences

Thank You

Any Questions ?