

Design Thinking By Al

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1 Empathize ๑ ทำความ เข้าใจ

Interview



Noted from your interview



Name: Autwachi

Profile: Thai Traditional Doctor

Life Style: Trekking, Colleting Herbs and Compouding Medecine

Define ตีโจทย์



กำหนดกรอบของปัญหา



User Description Autwachi is a Thai Traditional Doctor who working in almost very day in Chanthaburi.
Need a way to (user's need) Autwachi needs to verify plant morphology before collecting herbs
and compounding medicine for patient.
Surprisingly/ Because/But (user's insight)
It is normally difficult to visual check a different type of herb leaves as herb must be always collected in the morning time. He rarely meets the target because of time constraint.

Ideate

ระดม ความคิด



Sketch solution to meet your user's needs

- Plant herbs in the garden nearby his home.
- Hire more people to collect herb and train them to check herb leaves from photograph.
- Use drone to find out most possible area for collecting herbs.
- Use google map for faster trekking.
- Use robot to help collecting herbs.
- Use AI and image processing to identify plant morphology.
- ... etc

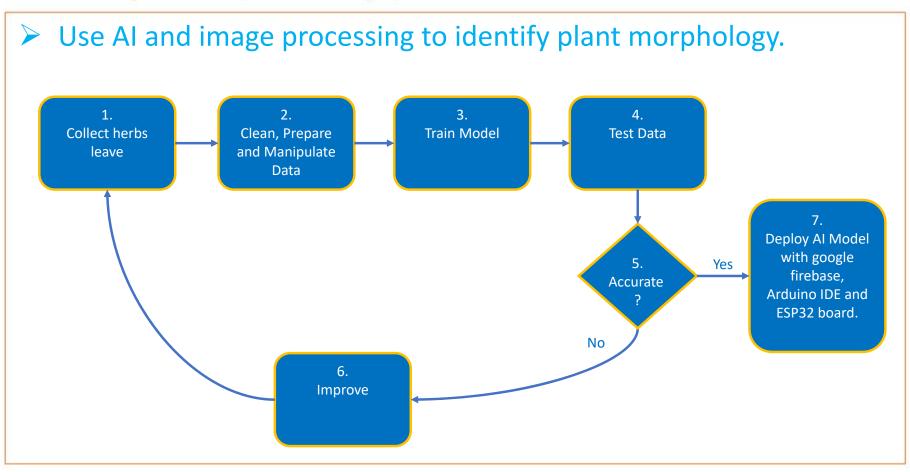
prototype สร้าง ตันแบบ





Draw your prototype





test
ทดสอบ



Share your solution and get feedbac test



Like

- Feels more comfortable to have supporter.
- Feels happy to save time for identify herb leaves.



Dislike

- Feels too expensive to invest in new technology.
- Does not want to trust 100 percent in Al.



Question

- How can to take picture for all herb leaves?
- How can AI detect the right herb leaves?
- Is there any ways to buy a cheaper camera and a cloud database?
- How can real time connect ESP232 / Arduino IDE board (IOT equipment) with cloud database to detect herb leaves image?



Idea

- Gradually download the target herb leaves from internet as initial train data.
- The more training data and testing data with good technique such as CNN, ConvNet or GoogLeNet can enhance the better detection.
- Use 12 month-free trial cloud database at the initial state such as Huawei Cloud.
- Use LORA WAN to connect IOT equipment with cloud database.

Appendix I – app.py

```
import cv2
       import numpy as np
       import dlib
      import pickle
                                                                                                   34
       detector = dlib.get frontal face detector()
       sp = dlib.shape predictor('shape predictor 68 face landmarks.dat')
       facerec = dlib.face recognition model v1('dlib face recognition resnet model v1.dat')
       FACE DESC, FACE NAME = pickle.load(open('trainset.pk','rb'))
       face detector = cv2.CascadeClassifier('haarcascade frontalface default.xml')
       font = cv2.FONT HERSHEY COMPLEX
                                                                                                   40
       cam = cv2.VideoCapture(0)
                                                                                                   41
14
                                                                                                   42
       buffer = (30, 10)
                                                                                                   43
       while True:
                                                                                                   44
           , img = cam.read()
                                                                                                   45
           gray = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
                                                                                                   46
          faces = face_detector.detectMultiScale(gray, 1.3, 5)
           for (x,y,w,h) in faces:
                                                                                                   48
              r1 = y - buffer[0] if y-buffer[0] >= 0 else 0
               r2 = y + h + buffer[0] if y + h + buffer[0] < img.shape[0] else img.shape[0]-1
               c1 = x - buffer[1] if x-buffer[1] >= 0 else 0
24
               c2 = x + w + buffer[1] if x + w + buffer[1] < img.shape[1] else img.shape[1]-1
               face = gray[r1:r2,c1:c2]
               dets = detector(img, 1)
               name = 'unknown'
               dmin = 0
               for k, d in enumerate(dets):
                   shape = sp(img, d)
                  face descriptor = np.array(facerec.compute face descriptor(img, shape))
34
                   for face desc in FACE DESC:
```

```
for k, d in enumerate(dets):
        shape = sp(img, d)
        face descriptor = np.array(facerec.compute face descriptor(img, shape))
        for face desc in FACE DESC:
           d.append(np.linalg.norm(face_descriptor - face_desc))
        d = np.array(d)
        idx = np.argmin(d)
       if d[idx] < 0.5:
            name = FACE NAME[idx]
            dmin = d[idx]
           print(name, dmin)
    cv2.putText(img, name+':\{:.2f\}'.format(dmin), (x,y-5), font, .7, (255,0,0), 1)
    cv2.rectangle(img, (x, y), (x + w, y + h), (255, 0, 0), 2)
cv2.imshow('img', img)
if cv2.waitKey(1) & 0xFF == ord('q'):
    break
```

Appendix II – trainpicture.py

```
import numpy as np
       import cv2
       import dlib
       import os
      import pickle
      path = './facedata/'
      detector = dlib.get_frontal_face_detector()
       sp = dlib.shape predictor('shape_predictor_68_face_landmarks.dat')
       facerec = dlib.face_recognition_model_v1('dlib_face_recognition_resnet_model_v1.dat')
       FACE DESC=[]
13
       FACE NAME=[]
14
       for fn in os.listdir(path):
       if fn.endswith('.jpg'):
16
              img = cv2.imread(path+fn)
17
               dets = detector(img, 1)
18
              for k, d in enumerate(dets):
19
                   shape = sp(img, d)
                   face descriptor = facerec.compute face descriptor(img, shape)
                   FACE_DESC.append(np.array(face_descriptor))
                  print('loading...',fn)
                   FACE NAME.append(fn[:fn.index('_')])
24
      pickle.dump((FACE DESC, FACE NAME), open('trainset.pk', 'wb'))
```