



Face Doctor -  
App to Measure  
your Health

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2024

**80** Pages  
27.6 cm x 21.2 cm

Ruled 7 mm • Ligné 7 mm

**EXERCISE BOOK**  
**CAHIER D'EXERCICES**

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SUBJECT/SUJET Science Fair

December 27th : Introduction

I am well into my project at this stage. My proposal form was submitted on the 15th.

For a long time, I've heard of early facial signs to detect illnesses and I've always been curious about it. That's why, for this project, I have decided that I will be researching these signs and what you can do to prevent these very illnesses from affecting you.

December 28th :

I am developing an application using Xcode 15 in the programming language of Swift. As of this time, I have developed my camera portion of my app, which will capture the picture and then it will use machine learning (ML) to process and analyze the picture for symptoms.

December 29th:

Today, the main portion of my research is on the basic clues to someone's health. Today, I read about diabetes and the symptoms of diabetes. I researched on Xanthelasma Palpebrarum, which is a yellow growth that normally occurs between your nose and eyes. It also may develop on one's eyelids. Tomorrow, I'm going to research on the next symptom. I also realized that to make the next part of my app accurate, I need to incorporate ML (Machine Learning) into my project. But, after a lot of research, I tried to incorporate TensorFlow into my Xcode Project. The main issue was that I was unable to even download TensorFlow. I have attempted multiple times today.

Since I am facing so much difficulty with the TensorFlow downloading, I have to get some help. I am in contact with an iOS developer that uses TensorFlow for ML Models, both pre-trained and newly built. This meeting with the expert will be tomorrow.

December 30th - Machine Learning Initial Setup

Today, I did a little more research for diabetes. I learned about another symptom of diabetes, called "granuloma annulare." This is when you have reddish bumps all across the body, but they can also occur on the face. This can be confused with acne, as it looks similar, but "granuloma annulare" also comes with flushed/red patches of skin. Today, I also had the Teams meeting with the TensorFlow expert. He helped guide me through the downloading process, but it didn't work, for some reason. I will try it again tomorrow, or I'll need to find a new solution.

December 31st - More trial for TensorFlow

I continued to try different downloading methods, but TensorFlow is just not cooperating! I believe I'll need to find another machine learning model to use for my project, from a whole new software.

January 1st - New solution!

New year, new solution! Now, I found a new software (free) called Supervisely which helps you annotate your images for a machine learning model. This is specifically for Object Detection models, because you need to label/annotate portions of images for Object Detection. I am going to work with this for today and see if it works.

January 2nd - Roboflow

Unfortunately, Supervisely did not work. I have been trying to experiment with multiple annotation websites but none of them are working! Finally, I found "Roboflow" which is another annotation website. After making an account, I inputted all of my pictures into it. After lots of trial & error, Roboflow did not work either.

I decided to keep looking for more annotation websites. I also discussed this with my father, and he said that I should use copy-right free images. After searching for copyright free medical image sights, I came upon Wikipedia Images, MedPix, and Open-i. Although it took time to change all my images to copy-right free, I finished that today.

January 3rd:

I need to start my annotations for my images. I did a lot more researching regarding object detection ML Models, around 2 hours. Finally, I found a final built-in Apple application on the app store, called ~~Create ML~~. RectLabel. RectLabel directly connects with Create ML, which is the Apple development machine learning trainer.

January 4th:

None of the annotation websites that I've found are working! I tried using RoboFlow again, but RoboFlow was not very intuitive and hard to navigate. Initially, I was aiming to use the built-in IBM Cloud Annotations, since everyone uses that. Unfortunately, IBM Cloud Annotations were removed last year, I believe.

Finding a way to annotate my images is going to be tough.

January 5th:

I have read many reviews about RectLabel. Apparently, RectLabel needs a fee of \$10 to actually work, but it isn't necessary. I tried to ignore the constant fee payment popups appearing while annotating my images.

It actually ended up working! I got all of my XML file annotations. There were over 40 files, so I need to combine them into one JSON file tomorrow.

January 7th - Annotations

I was unable to work on the project yesterday. Today, I am combining all of the XML files to fit in one large JSON file. JSON stands for: "JavaScript Object Notation". CreateML requires my annotations for the bounding boxes to be in JSON file format, otherwise it will not be accepted.

Today, I was trying to figure out how I could take all the XML files and create a new XML file where I could paste all the existing files into.

January 6th, 2024:

Yesterday's research did not help me. I am unaware of how to convert the XML files to one big one.

I tried to compress all of them into one, but that just created a folder with all the separate JSON files.

January 6th, 2024:

No luck today either. The XML files are not cooperating. I mainly did research today to understand the formatting of XML.

January 10th, 2024:

Today, I found the obvious solution to my project while eating lunch: I needed to just take an XML file, delete the content from other files and copy and paste the image annotations into the XML file. Then, I could just convert the one XML combined annotations file into one big JSON file.

I ended up putting all of the XML annotations into ONE XML file.

January 11th - JSON File

Today, I found a XML to JSON converter in a website called FreeFormatter. FreeFormatter has multiple file conversions. Yes, the file got converted!

I also tried to then take my newly converted JSON File and provide it to Create ML, the Apple machine learning development environment. Create ML kept giving me an error: "JSON file is not in the correct format." What is wrong with my JSON file?? I will conduct more research tomorrow.

January 12th:

I did not have enough time to work on my JSON file issue today, but I did look at it.

After doing more research, I learned that different JSON files have different formats. Although Create ML does not specify what format it requires, maybe I should try changing my formats to see which one suits Create ML.

January 13th:

I changed my format today! Now, my JSON file has the x-coordinates, y-coordinates, width and height. Fortunately, after spending 5+ hours manually converting and researching, Create ML accepted it!

Unfortunately, I am facing an error. Create ML is apparently only detecting 3 images for my identifier of granuloma annulare and 0 for xanthelasma palpebrarum. Why?

January 14th:

I have no clue why this is happening! For all my previous errors, it felt like I had made a mistake, but this time, I am totally clueless why this is happening.

CreateML should be actually detecting 37 images for "xanthelasma palpebrarum" and 38 images for "granuloma annulare." On top of that, the instance count should be 100+, since there are multiple symptom appearances at once.

January 15th - JSON !?!

This is an extremely confusing error. I have done so much research, but nobody online has faced a problem like this in Create ML.

January 16th } I have spent all  
January 17th } of these days  
January 18th } working on the  
January 19th } issue!!

January 20th :

Finally, I found the solution! I started to look at the full picture of my files, instead of looking at the code, cluelessly.

I noticed that all but THREE of my images (used in JSON) had spaces between their names. For example, "x 1," "x 2" and so on. This is a coincidence, because Create ML is only detecting 3 images!

January 21st :

The reason all my annotations weren't being detected was because of the spaces between my image names!! Since JSON files are in readable format, they contain the image names. In many cases in programming, spaces between words pose as a problem.

I removed all of the spaces in my images and for the JSON files. It worked!!

January 22nd :

Yesterday, I trained my model overnight! I pressed the "train" button and started training my model for 40,000 iterations.

The iterations for my model represents the total number of times I have to continuously show my images to the model, which it is trained

January 23rd, 2024 - Previews?

Now that my model is trained, I need to truly see how well it actually performs if I provide images to it that I haven't trained it with. I provided many images to my model using the "Previews" section in Create ML.

My model was doing quite well, but it did incorrectly guess many of the testing images.

January 24th, 2024:

My model is done!

I decided that I would work on refining my model more once I was finished integrating my ML model into my camera app, which I have already developed (in Xcode).

January 25th:

I watched lots of videos for the integration of my machine learning model.

All of them imported the "Core ML" framework, which is the module used in Xcode to import external ML models. Tomorrow, I will start actually integrating my model.

January 26th:

I started writing the code today, based off of some of the videos I had watched. After I finished writing the code, I realized that the videos I had watched were all about Image Classification ML models!

My ML model is an object detection model!



February  
March 1st - Model Integration.

I was really busy the past few days. Now, I can continue with model integration.

The main problem I am facing is that mainly, my model does not cooperate with the basic ML model integration code to add into a camera app. I have experimented with this code, and it does not work with my ML model.

February 2nd - More model integration:

I experimented even more with the Swift (Xcode language) today. Not is changing! The syntax for the model integration doesn't match with my model.

February 3rd:

I looked at a few object detection model sources for integration. After applying similar codes in my "CameraView" file (which contains the camera portion app), I was just faced with more errors.

Feb 4th

Feb 5th

Feb 6th

Feb 7th

Feb 8th

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Feb 15th

I tried to  
fix this  
model  
integration  
problem.

Feb 17th:

This problem is quite frustrating, but I believe that the TYPE of model I have is what this problem is about. What if I change my model to an

## IMAGE CLASSIFICATION MODEL?

Image Classification	Object Detection
- Detects WHOLE picture	- Detects a part of the picture
- No need to use annotations	- Needs annotations, to show coordinates of OBJECT

Feb 18th:

If I change my model to an Image Classification model, then that may be a drastic change for my app.

I have decided that I will start creating my image classification model tomorrow and then compare both models.

Feb 19th:

I already have all my images + data, I just don't need my annotations anymore! This is because my model detects a part of the image, but the image classification ML model classifies the FULL image.

Feb 20th:

I started training my model today. The training is elaborated in my "Method" section of my CYSF platform.

Feb 21st - Model Integration.

I tried integrating this model today, called "Diabetes Classifier," into Xcode camera app in my "Camera View" file. It worked !!

Feb 22nd - 25th :

I started understanding my training graph, as well as conducting performance tests. All of my information is provided in the "Analysis" section of my CVSF platform.

Feb 28th :

Today, I added the text part of my image classification results to the app! This is the part where the results are printed on the screen.

Fortunately, I faced no errors !!

March 1st - March 15th - Project and Trifold Finalization

These 2 weeks, I started:

- ↳ completing my CVSF platform
- ↳ Creating my trifold
- ↳ Filming my video for CVSF
- ↳ Finalizing my logbook!

This week, all of the final touches were added to my app, so that my product can be functioning perfectly!

The entire step-by-step process is explained in my platform.

In the end, the image classification machine learning model was the only model that actually worked well. My model had a performance test accuracy of 96.7.!