

# Progress Report 1

DP39

Oct 8,2019

## 1) Project title:

Old tile: Skin Problem Recognition System

New title: Skin Problem Detection System

The new title is more accurate to describe the system than the old one, since we would like to develop the system which is able to detect and locate the skin problem (ex:acnes) on the skin images automatically.

## 2) Names, Student numbers and emails:

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2. Zhuzhen Li      email address: [zhuzhen.li@mail.mcgill.ca](mailto:zhuzhen.li@mail.mcgill.ca)  
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## 3) Project supervisor(s):

1. Xue Liu    email: [xueliu@cs.mcgill.ca](mailto:xueliu@cs.mcgill.ca)
2. Xuan Li    email: [xuan.li2@mail.mcgill.ca](mailto:xuan.li2@mail.mcgill.ca)

## 4) Group meetings and meetings with advisor(s):

### Group meeting:

1. 24th.Sep Discuss the details of the plan and modify the project proposal.
2. 29th.Sep Search the related papers and algorithms. Discuss how to collect selfies.
3. 1st.Oct Learn how to use the labellmg tool. Check the progress of data collection.
4. 7th.Oct Label the images and discuss how to use traditional computer vision to detect acne.

### Advisor meeting:

1. 26th.Sep
2. 3rd.Oct

## 1) Engineering Tools

1. The Mac laptops which we are using are necessary to develop the system.
2. The labellmg is the tool to label all the images which we collected. If we use the machine learning to train the model, the training dataset should be the images which labelled the location of skin problem.
3. The Keras is a high-level neural networks library and capable of running on top of TensorFlow, CNTK or Theano. We need the Keras to implement neural networks.

4. The Google cloud should be used since the dataset maybe contain big data and we need the high performance GPU to train model.

## **2) Team Work**

We plan to share our work equally during the two terms. However, we also need to consider our interests and abilities, try to allocate the work we are skilled in to each group member. It will improve our working efficiency and quality of the project. For example, Xinquan collected selfie images since he has numbers of customers in China. Zhuzhen was responsible to label these images. Moreover, we all need to spend time to learn the relative knowledges of computer vision and machine learning.

We use the github to synchronize our work online, we can check group members progress and upload own code. For manage time, we just use the calendar tool in Mac.

## **3) Impact on the Environment**

Our project is mainly software development project. It seems doesn't have serious impact to the environment. However, the greenhouse gas footprint can not be neglected. According to the report, "information communications and technology industry produces more than 830 million tons of carbon dioxide (CO<sub>2</sub>) annually. That's about 2% of global CO<sub>2</sub> emission. Projections suggest that ICT sector's share is expected to double by 2020." Normally, the energy created to store the data is not green. Therefore, we use the google cloud to store the data if the dataset is big. Google cloud use 100% renewable energy and it will reduce the impact to the environment.

## **4) Ethics and Equity**

During the selfies collection, we encountered some problems. Since selfies are private for people or people feel embarrassed to send own selfie to stranger, lots of customers do not would like to attend our selfie collection activity, even we have free gifts for participants. For using the neutral network to train model, we would like to collect thousands of selfies which all contain the acne problem. In fact, the task is hard to realize. Therefore, we decide to write a program to produce the required data automatically, which combine the selfie image with the single acne image and smooth the edge of acne image. We are able to produce the images that contain acnes on different position of face and easy to know the location of acne for us, then we can label these acne conveniently.

## **5) Life Long Learning**

Develop the skin problem detection system, we should grasp the computer vision and machine learning knowledge and be familiar with the python coding. In the early stage, we would like to use the eroding and dilating method to detect acnes and dlib to recognize the human face in each image.

For soft skills, we should learn the ability of drawing inferences about other cases from one instance, since there are rare experience about detecting the skin problem. However, we can acknowledge the algorithms in detecting other stuffs and adopt various of different ways to achieve our goals.

## **6) Recent progress**

1. In the past two weeks, we searched the skin dataset online and found some skin problem data such as acne on dermnet website. However, there is watermark on the each image and each type of disease doesn't have enough number of images to train our model. We still tried to contact with the dermnet website to request these high resolution images but didn't get any response from them.
2. Therefore, we decided to collect the images offline by ourself, we have collected more than two hundreds of customer selfies. We did the selfie collection activity in our Wechat group in China. We posted the announcement which includes the detailed instructions about how to take photo and submit them. We asked participants to take photo without their makeup and open the flashlight since these selfie can clearly show the facial skin problems of each person. They also tried to take several pictures under both natural light and lamplight. It will help us to do the research how the different source light influents the detection results.
3. We searched and discussed the possible methods to detect the acne, which include the traditional computer vision method, and the deep learning method to train convolutional neural network model. We decide to implement both of methods and compare the results.
4. We also got start to learn the relative tools such as labelImg and neural network library such as Keras, we will use them to do our project in the next step.

## **7) Future plans**

1. We will keep collecting the selfie images and skin problem images online and offline.
2. We will learn the eroding and dilating method, dlib and Keras libaraies. (Due on 12th.Oct)
3. We try to implement the traditional computer vision algorithm to detect the acnes and mark the problem locations on the input selfie image. (Due on 22th.Oct)
4. We will try to use the dlib face recognition library to detect the face on the input selfie image. (Due on 18th.Oct)
5. We will keep learn the knowledge about computer vision and convolutional neural networks.