The Deep Skin disease(dermatosis) diagnoses system

Week 1

# Project plan:

## Stage1

### Objective: Diagnose the eczema

1. Collect the data
2. Built up the dataset using machine learning
3. Build up the model based on the pre-trained densenet model (imagenet), fine tune it to make a binary classification

## Stage2

1. Expand the system to urticarial
2. Use similar system to collect the urticarial data
3. Improve the model to do a generalized classification

## Stage3

1. Refine the system to do an in-depth diagnosis eczema and urticarial
2. Make it capable of distinguish the minor type of

## Stage4

Build up a highly generalized system that capable of distinguish a wide range of dermatosis

PS: transfer such system to the Mobile Platform as a APP

# The current diagnosis methods

1. 皮肤镜

2. 临床观察

3. 化验

# Data we have and the methodology of collecting the data

## Open datasets

UCI

1. <http://archive.ics.uci.edu/ml/datasets/dermatology>

Kaggle:

1. <https://www.kaggle.com/allunia/skin-detection/data>
2. <https://www.kaggle.com/c/cervical-cancer-screening>

Imagenet:

Use it as the foundation image feature datasets. To transfer the feature learned from it to the skin detection problem

## Internet and Search Engine

We plan to use the spider program to crawl the Internet, collect as many photo as possible.

We first collect the photo of eczema, and filter the irrelevant photos

Then we try to localized the Lesions, clip it

Normalize it and use affine transformation to increase the amount of training data, give model the affine transform invariant characteristic.

We will be very cautious on the color transformation.

# Related works

CNN

We will use Convolutional Neural Network as the foundation of our system.

Mamogram

It is well developed and still an active research topic, several MICCAI paper mentioned it.

An article about the AI based dermatosis diagnoses system

<http://derm.dxy.cn/article/539648>

<http://www.sohu.com/a/141803141_114731>

This system is built by three party

One hospital: Hunan Xiangya Second Hospital, one AI startup Company: Dacheng Technology Ltd. And an Internet Company (Doctor social platform) 丁香园

It is based on the data collected by Xiangya Hospital, including three kinds of training data

1. The Dermatoscope(皮肤镜) images
2. Normal picture (take by camera)
3. Normalized pictures

And the main objective of current stage is the lupus erythematosus (红斑狼疮)

Different from our system, it is made to assist the diagnosis of doctors. More specific, to distinguish the different sub types of erythematosus. Whereas our system is targeted to the end user and it is made for a screening process.

Compare to the depth and accuracy, I propose our system to be universal and highly usable, we will diagnose the common disease with acceptable accuracy and high speed.

2 mature direction:

1. lupus erythematosus
2. skin cancer

https://wenku.baidu.com/view/b22202f75ef7ba0d4a733bcf.html

# References:

[1] <http://archive.ics.uci.edu/ml/datasets/dermatology>

[2] <https://www.amazon.com/Skin-Disease-Diagnosis-Treatment-4e/dp/0323442226/ref=sr_1_3?ie=UTF8&qid=1516860408&sr=8-3&keywords=skin+disease+diagnosis+and+treatment>

[3] https://en.wikipedia.org/wiki/Cutaneous\_condition

# Resources demand:

1. The book about the skin disease diagnoses

Skin Disease: Diagnosis and Treatment, 4e 4th Edition USD $ 77.51

1. More disk space on GPU Cluster(200GB) to support the data collection