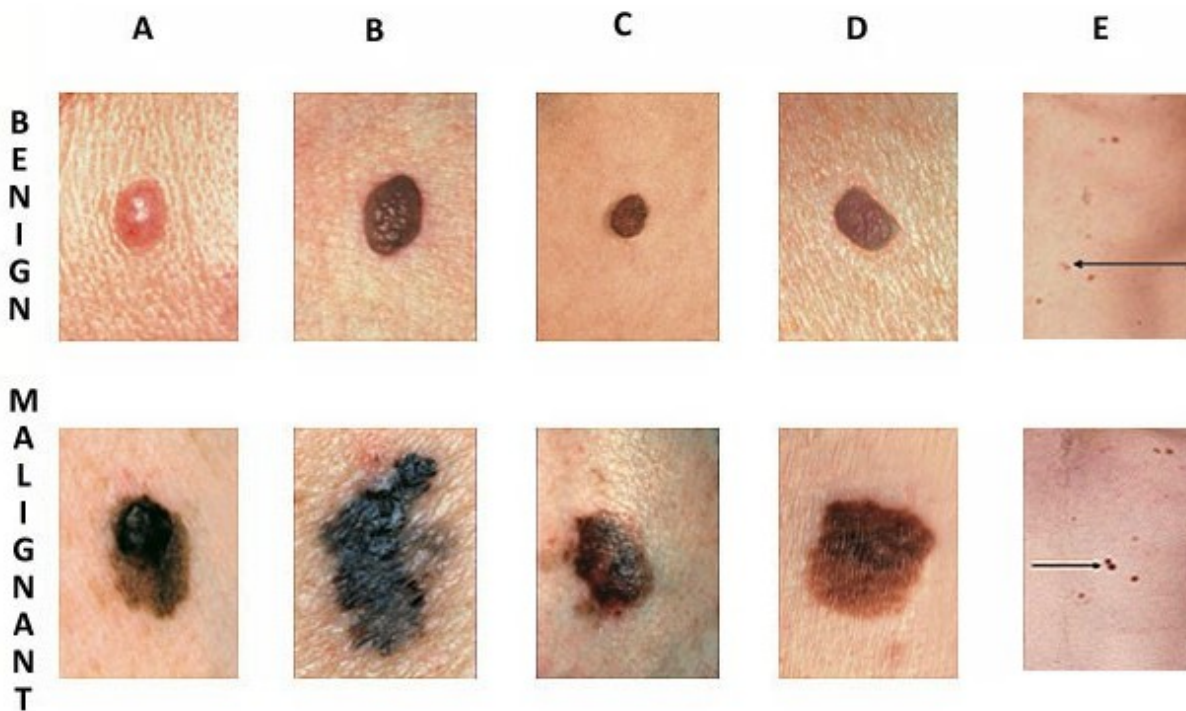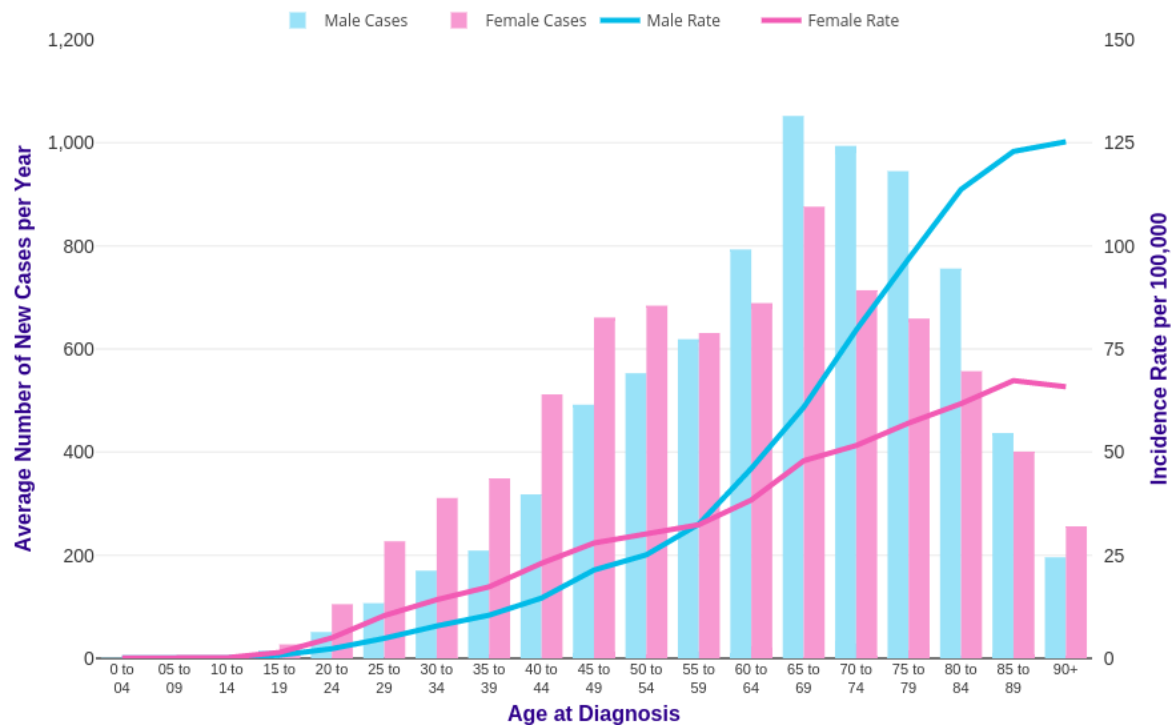# Research

Define Problems

According to skincancer.org, One in five Americans will develop skin cancer by the age of 70. Skin Cancer is most common of all cancer types, as it is exposed by the sun. People usually only see doctors when their mole gets larger, which makes it extremely dangerous for the potential patients. Most of diagnosis ends up being benign, non-cancerous, but that takes most of the dermatologist's time.

Target User and Insight

The majority of people diagnosed with melanoma over age 55. And people starting with age 29 starts to have signs malignant moles showing up.

Market Research:

The annual cost of treating skin cancers in the U.S. is estimated at **$8.1 billion**: about $4.8 billion for nonmelanoma skin cancers and $3.3 billion for melanoma. We want to focus on diagnosis, so that patients only goes to the doctor when we have high confidence of the mole being malignant

Key Finding:

According to skincancer.org. The estimated five-year survival rate for patients whose melanoma is **detected early is about 99 percent in the U.S**. The survival rate falls to 63 percent when the disease reaches the lymph nodes and 20 percent when the disease metastasizes to distant organs. Diagnosis is a key for skin cancer survival.

Exploration

A convolutional neural network (CNN) is a class of deep, feed forwarding artificial neural networks, most commonly applied to analyze visual imagery. This is perfect for skin cancer classification for the end users when they see a new mole on their body. In 2017, a Stanford research study was able to use neural network to match the results of 26 different dermatologists.
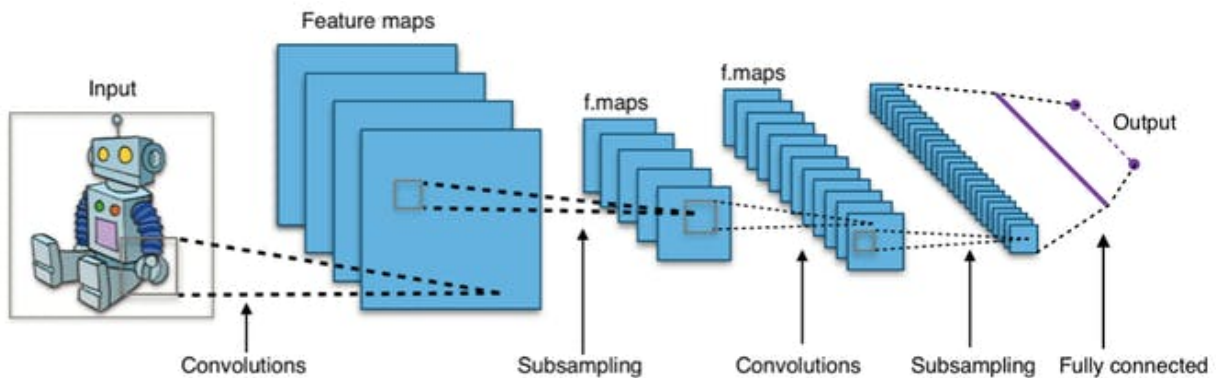
However this is done through looking at different images. We believe we can use the AI to classify skin cancer for patients in real time and offline.
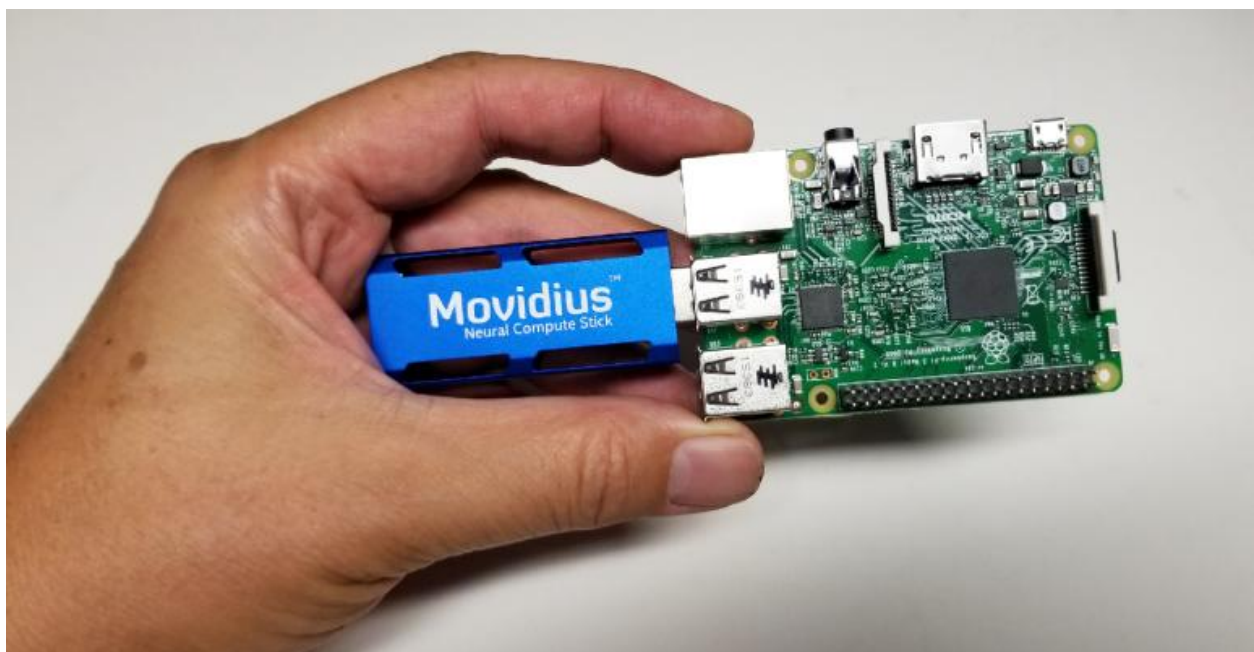
Realization

The current AI technologies is capable of doing cancer detection in real time and off-

line, which allows us to both train on the cloud and deploying on the edge.
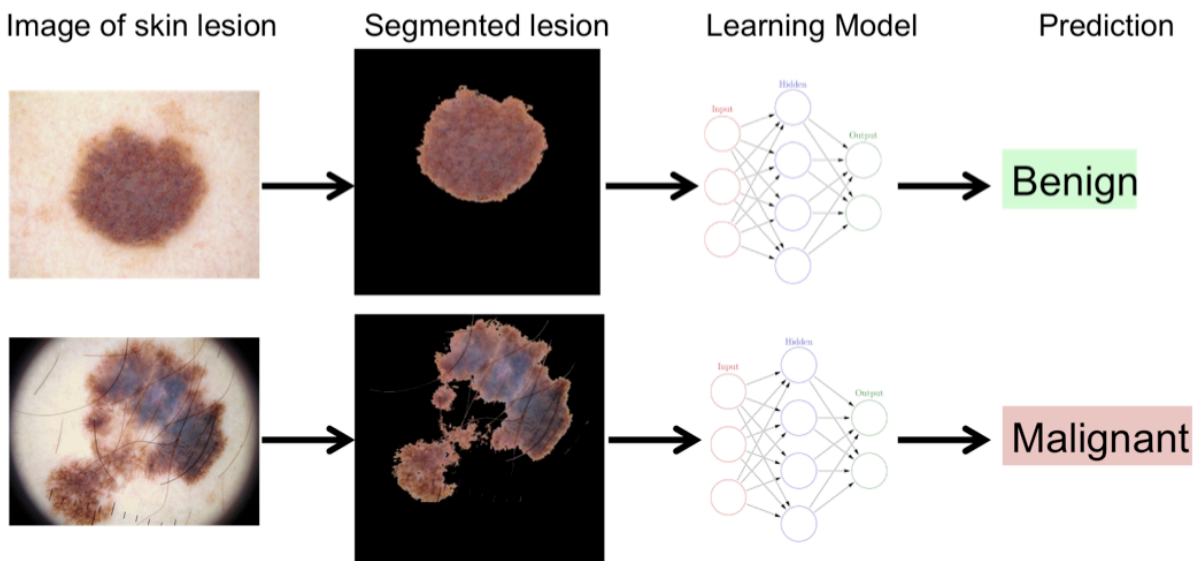
Training on the Cloud

The GPUs are still rather important for training AI Model, with ISIC archive (https://isic-archive.-

com) providing us the skin cancer data, we can reliably train the dataset on our GPU-enabled

servers which are hosted with AWS using Caffe Framework. By doing so, we've taken 500 im-

ages of each images from the ISIC archive to train our models. We've obtained around 85%

accuracy, this can be improved with more data.

500+ Nevus

500+ Melanoma

500+ Seborrheic Keratosis

500+ None

Deploying AI on the Edge

With the advancement of AI on the Edge, which allows the device themselves to infer-
ence the device offline. Using Movidius Neural Computing Stick (cost $70) and an En-
doscope camera, we are able to classify cancerous mole in real time. Making early de-
tection for skin cancer both technologically feasible, economically viable, and public
accessible.

Final Design