Introducing
EarlyDetect

A Platform to Improve Cancer Diagnosis by using Artificial Intelligence

O.

About Cancer

About the disease

▷ Cancer is one of the deadliest diseases caused by the abnormal growth of the cells, with the potential to invade or spread to other healthy parts of the body.

▷ It harms when these cells divide uncontrollably to form lumps called tumors (except in the case of leukemia).

▷ When a tumor successfully spreads to other parts of the body and grows, invading and destroying other healthy tissues, it is said to have *metastasized* and the condition is very difficult to cure.

▷ Cancer claims around 10 million lives every year, but early detection can certainly save a large fraction of cancer patients.

1.

What is EarlyDetect?

About the Platform

EarlyDetect is a user-friendly, scalable software platform to aid diagnosis of certain types of cancer in humans by classifying tumors as benign or malignant with images of the tumor site.

It uses sophisticated machine learning algorithms to *'learn'* from every diagnosis, thus improving its accuracy every time it is used.

About the Platform

The current version of EarlyDetect can accurately diagnose the following types cancer:-

➔ Melanoma
➔ Squamous Cell Carcinoma
➔ Basal Cell Carcinoma
➔ Retinoblastoma (with specialised images)
➔ Lymphoma (of the skin)
➔ Breast Cancer (requires some human input for diagnosis)
➔ Brain tumor (Glioma & Glioblastoma)

2.

Why EarlyDetect?

What is the need for such a platform?

The Goal

We built EarlyDetect to empower every person with the ability to detect, assess, and mitigate mankind's deadliest affliction - Cancer, at an early stage, and save thousands of lives across the world. Because every single life is precious.

Need for the platform

- It is of utmost priority for every person to be aware of the hazards to his/her health, in order to remain fit to keep up with today's fast paced life.
- The number of cancer cases is increasing steadily, scourging more victims with each passing day. Most types of cancer are curable in early stages, but a late diagnosis can turn them deadly.
- Our aim, through this platform is to make cancer diagnosis easy and accurate, by the use of machine learning, while relying on minimum possible input from the user to maintain precision (just an image of the site, in most cases).
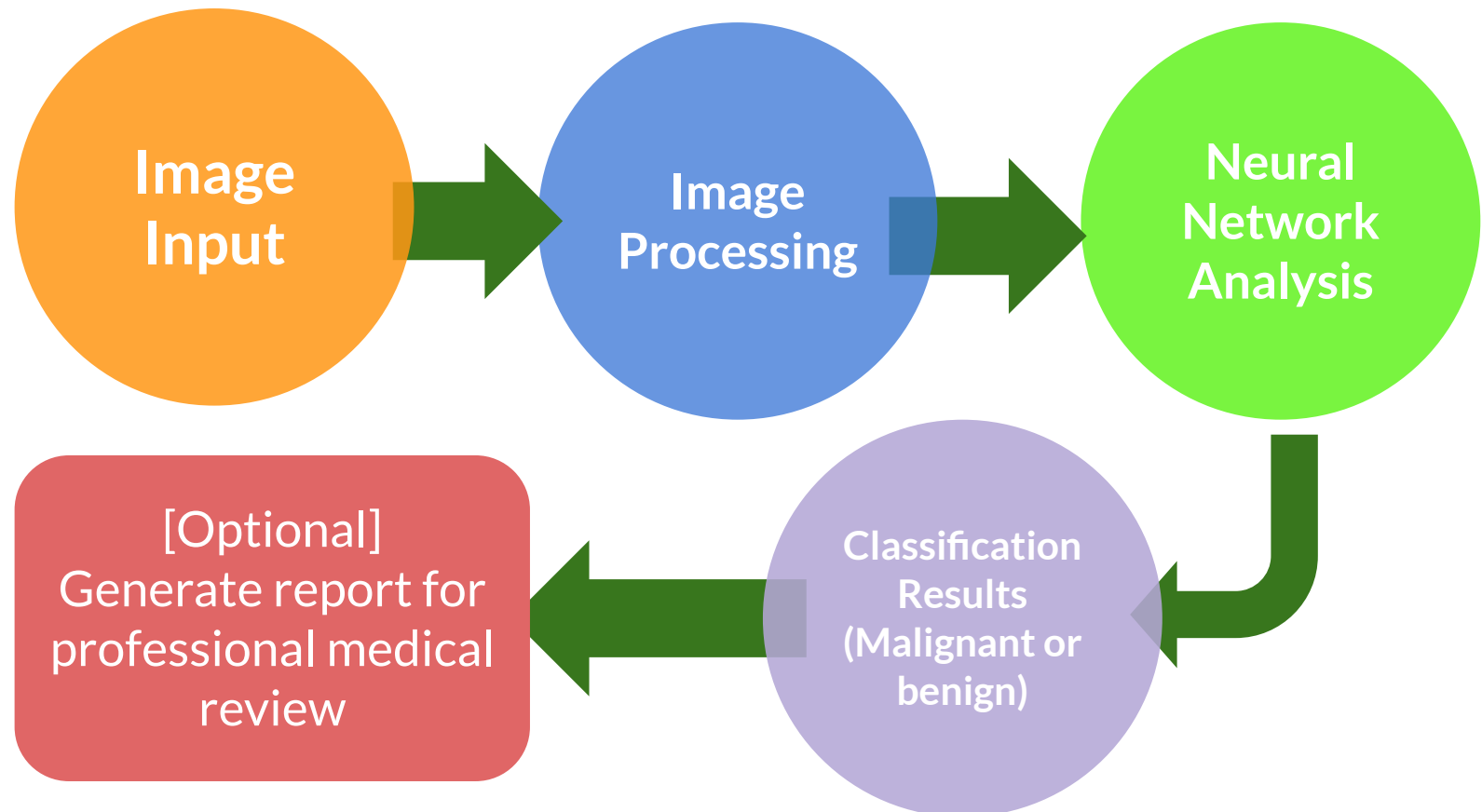
3.

How does it work?

The basic principles behind EarlyDetect

The Diagnosis Process

EarlyDetect uses a simple, scalable four step general process to perform a diagnosis.

Image Input → **Image Processing** → **Neural Network Analysis** → **Classification Results (Malignant or benign)** → **[Optional] Generate report for professional medical review**

4.

How was it developed?

A glance at the development process

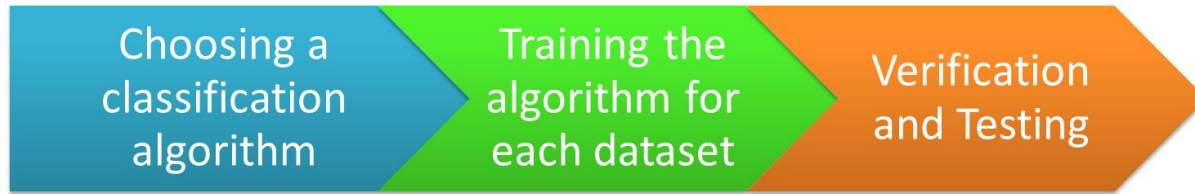# EarlyDetect was developed into two distinct parts :-

Front End

Front end User Interface, developed in Python

Back End

Back end processing software, developed in MATLAB

Back end development

| Choosing a classification algorithm	Training the algorithm for each dataset	Verification and Testing

Step 1 - Supervised neural network was selected as the optimal algorithm for the classification of tumor images.

Step 2 - Datasets were compiled, fed to the supervised neural network for training. The network was then tested on separate datasets.

Step 3 - The classification was found to be extremely accurate, which clearly indicates that supervised artificial neural networks is an optimal method for classification of tumors.
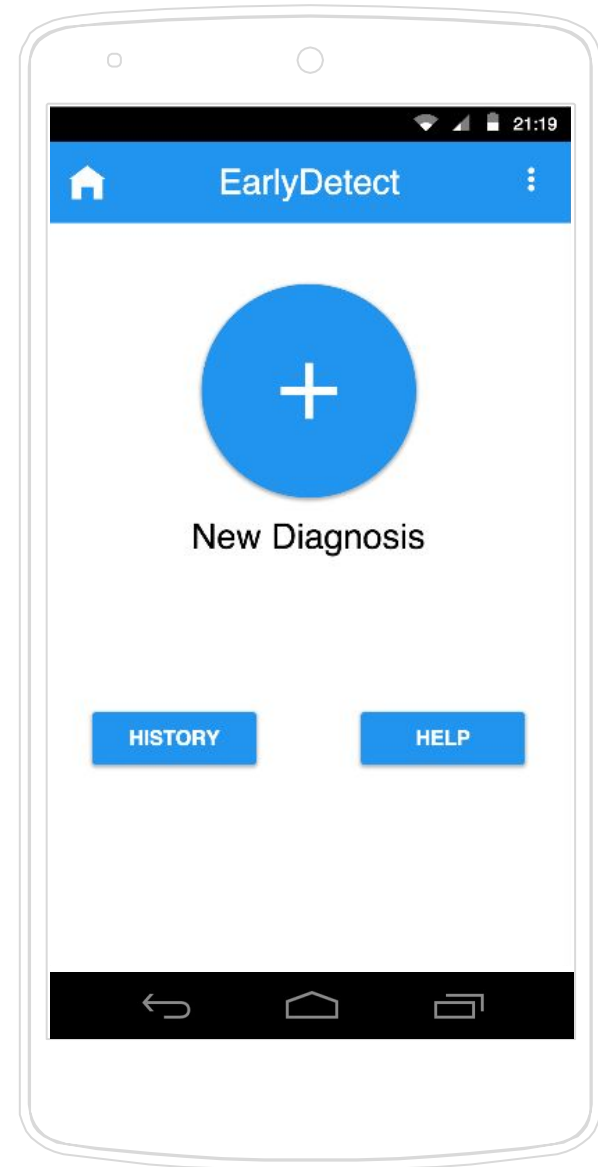
Front End
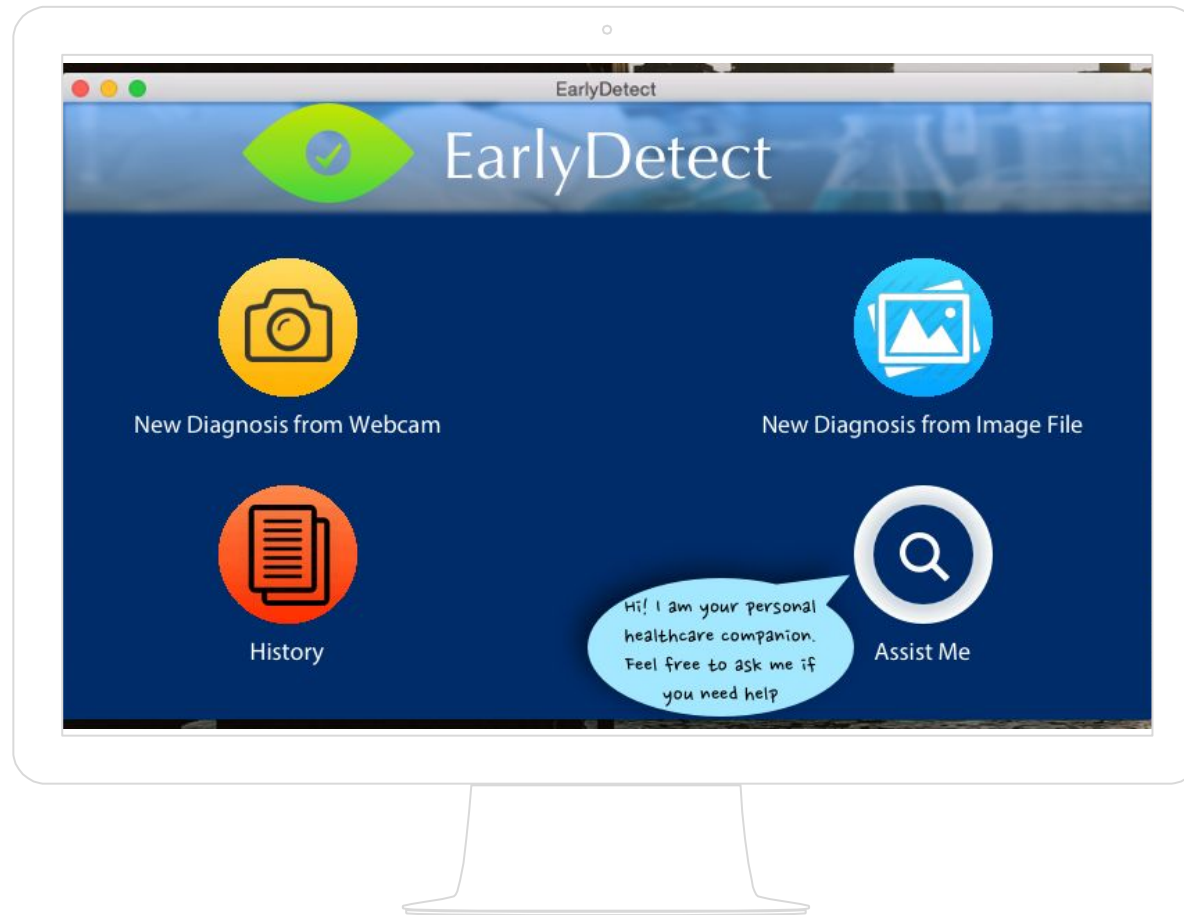
Desktop User Interface
The GUI was built in Python using the Tkinter library.

Android App

Alpha version of cloud-based cancer diagnosis app
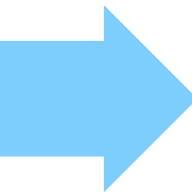
5.
Results

93.5% Accuracy

Average Accuracy For 7 different types of cancer
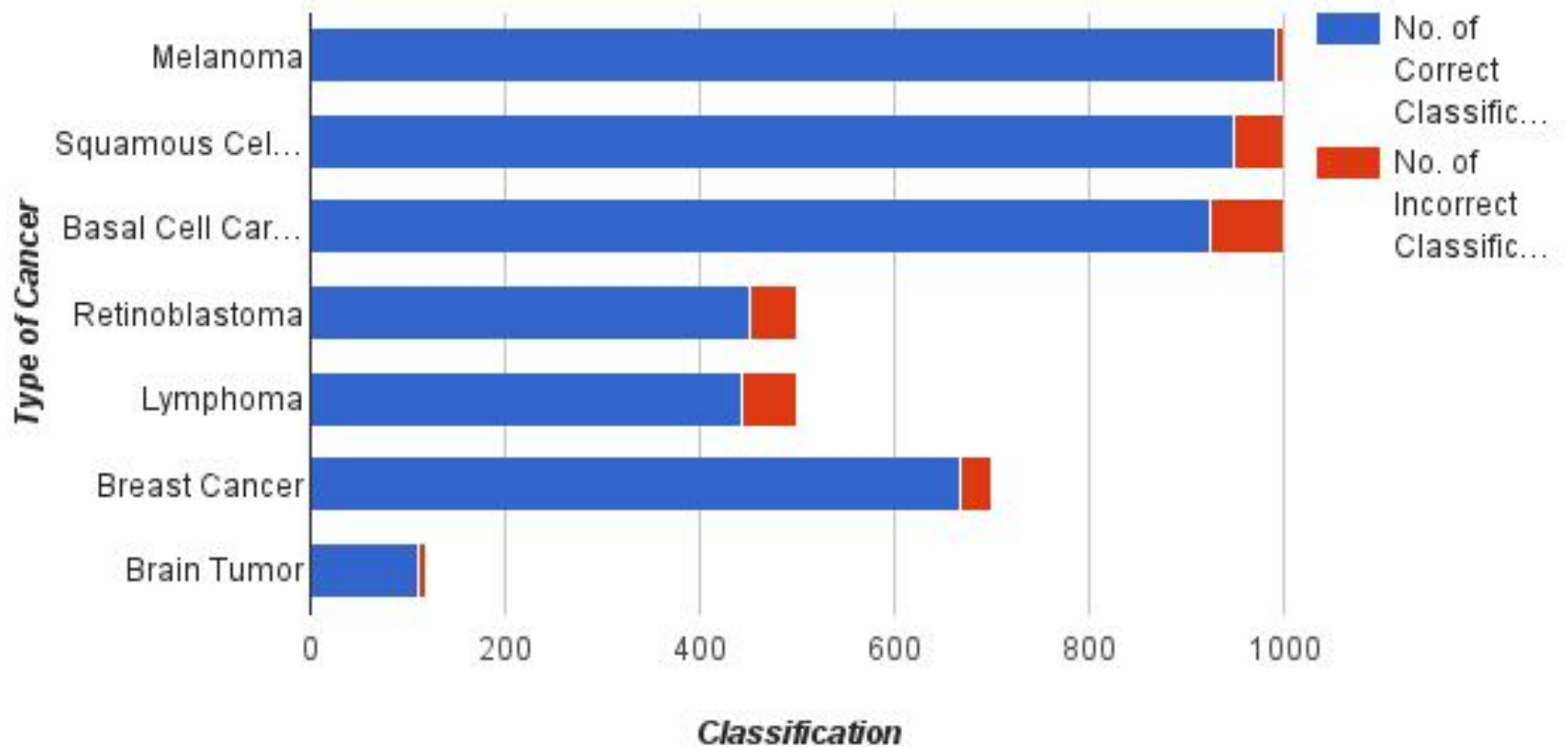
9 in 10

users found it to be friendly and easy to use

∞

Infinitely Scalable Platform

Classification Comparison Across Different Cancer Types

6.

Future Scope.

Future of the platform

❖ Since EarlyDetect uses machine learning, it is easy to implement more features, or make the diagnosis more accurate, by simply adding more training data.

❖ Because the classification features are extracted automatically, it can easily be expanded as a platform, to diagnose not only other types of cancer, but other diseases with visual symptoms too! (e.g. Measles, cataract etc.)

❖ A complete transition to the cloud is on the roadmap, to enable everybody with access to a web browser with the ability to detect cancer.

❖ A smartphone app based on the cloud can help us reach millions of potential users, and save thousands of lives.

Thanks for your time!

We hope this project can revolutionize cancer detection and help save lives!