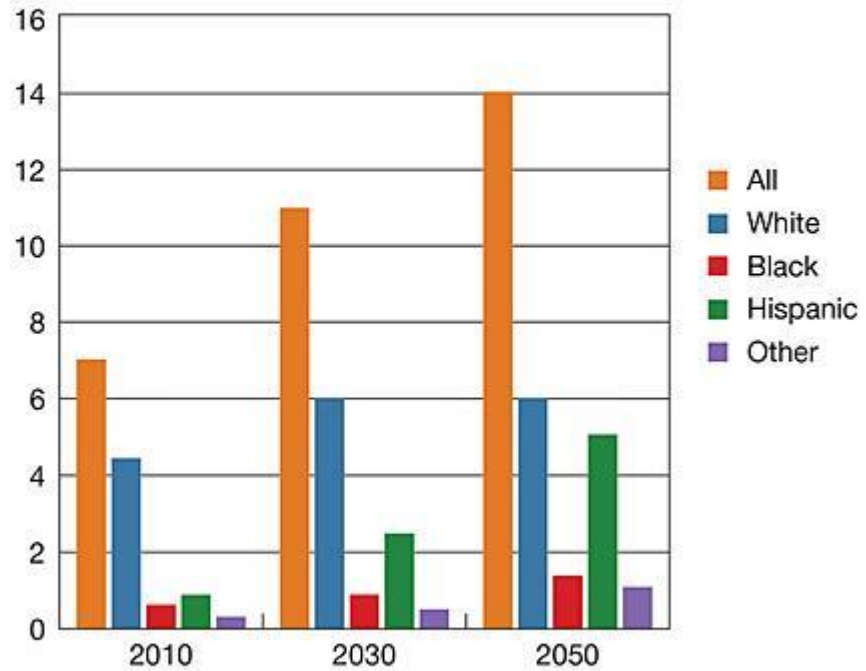# DIABETIC RETINOPATHY DETECTION

IRET CARE

WHY DIABETIC RETINOPATHY

DIABETIC RETINOPATHY IS AN UNCOMMON COMPLICATION OF DIABETES MELLITUS IN NIGERIAN PATIENTS. THE INCIDENCE IS 4-6 PER CENT.

IN 758 PATIENTS. 60 PER CENT. OF THE 35 PATIENTS SEEN BELONG TO THE HIGHER SOCIAL CLASSES. ALL THE PATIENTS BUT TWO HAD MATURITY-ONSET DIABETES MELLITUS.

NIGERIA HAS APPROXIMATELY 700 OPHTHALMOLOGISTS FOR ABOUT 200 MILLION PEOPLE. HOWEVER, WHO RECOMMENDS ONE OPHTHALMOLOGIST FOR 50,000 PEOPLE IN DEVELOPING COUNTRIES OF ACCREDITED MEDICAL SCHOOLS IN NIGERIA, 27 ARE ACCREDITED TO TRAIN RESIDENT DOCTORS IN OPHTHALMOLOGY. HENCE AS A COUNTRY WE ARE 77.5% SHORT OF RETINA SPECIALIST

Projections for Diabetic Retinopathy
in 2030 and 2050 (in millions)

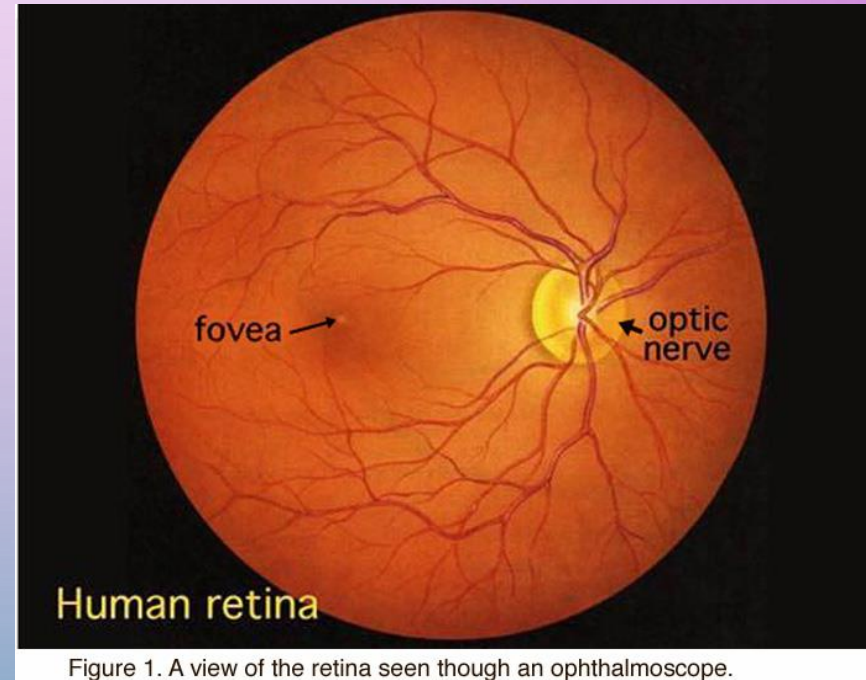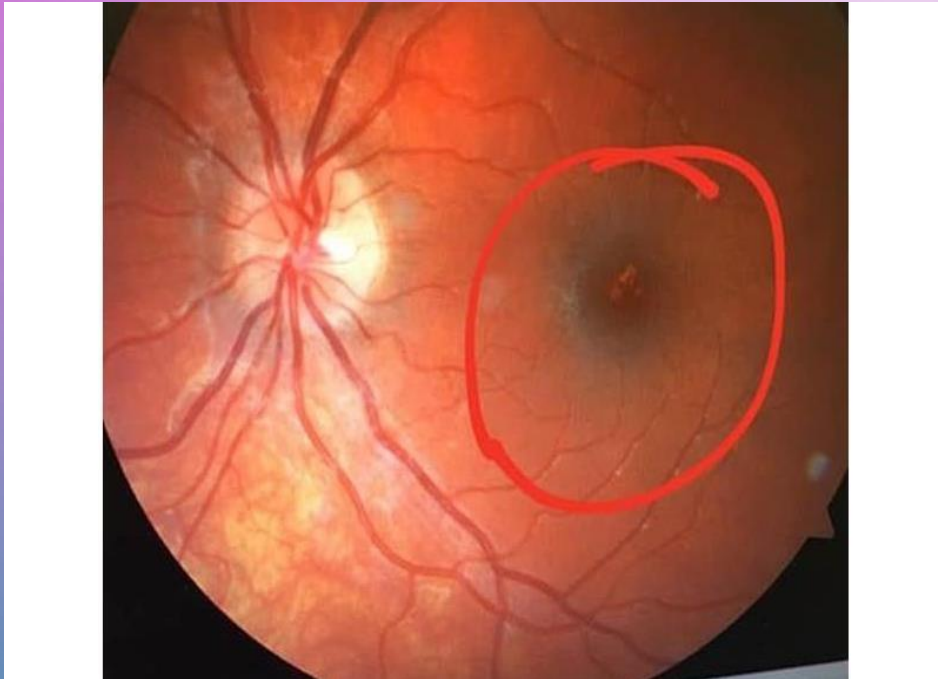2010 Prevalence Rates of Diabetic Retinopathy by Race
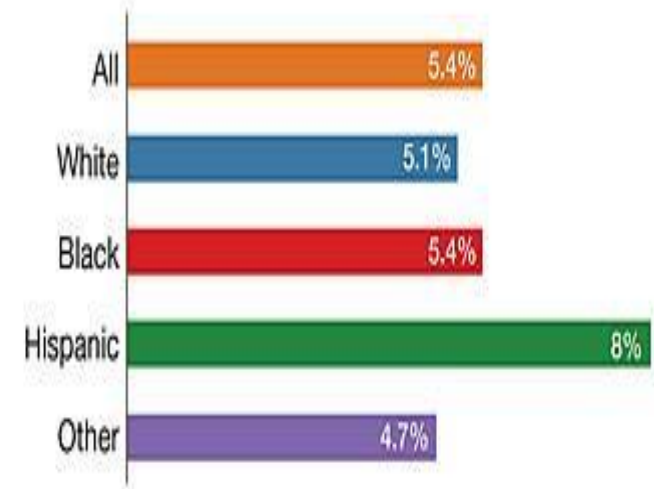
RETINA IMAGE

Figure 1. A view of the retina seen though an ophthalmoscope.

fovea

optic nerve

Human retina

METHODOLOGY

The Diabetic Retinopathy can be detected using Artificial Intelligence Systems.

Convolutional neural networks (covnets) or CNN are types of artificial neural network for processing data that has a known grid-like topology i.e image data which can be categorized as a 2d grid of pixels (heights and widths). This set of artificial neural networks has uses a convolution which is a type of linear operation instead of using matrix operations in one of any layers in the hidden

For training the Image Transfer Learning was leveraged using Efficient Net a CNN Architecture which is commonly used in the deep Learning Community for Image Classification Problems

DATA USED

Currently, technicians visit to these distant places to acquire photos, which are then reviewed and diagnosed by highly qualified clinicians. Their objective is to use technology to expand their efforts, to be able to automatically screen photographs for illness and offer information on the severity of the problem. [4]

Retina Images or large set taken using Fundus Photography, taken under different conditions and a technician has rated each of the image to check for the severity of having diabetic retinopathy on a range of 0-4 and labelled each image according to each category in which the image falls as below

0 - no DR 1 – mild 2 – moderate 3 – severe 4 - proliferative DR

RESULTS

We validate the model on the target data after each training epoch. The picture class corresponding to the highest score is predicted using class scores extracted from the final fully-connected layer. The network is trained for 10 epochs while the validation loss and Accuracy are monitored. We stop the training process and preserve model weights for the epoch with the greatest validation accuracy. This Iterative Process was done using Google Colab GPU Service for faster computation of Results

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epoch	train_loss	valid_loss	error_rate	accuracy	time
0	0.458047	0.332210	0.122951	0.877049	09:03
1	0.547318	0.360764	0.113388	0.886612	09:01
2	0.414692	0.237045	0.054645	0.945355	09:05
3	0.293820	0.108665	0.040984	0.959016	09:09
4	0.248868	0.117585	0.032787	0.967213	09:07
5	0.296921	0.156885	0.049180	0.950820	09:08
6	0.219158	0.080669	0.030055	0.969945	09:09
7	0.181101	0.079274	0.028689	0.971311	09:07
8	0.183808	0.078129	0.030055	0.969945	09:17

PROJECT FLOW
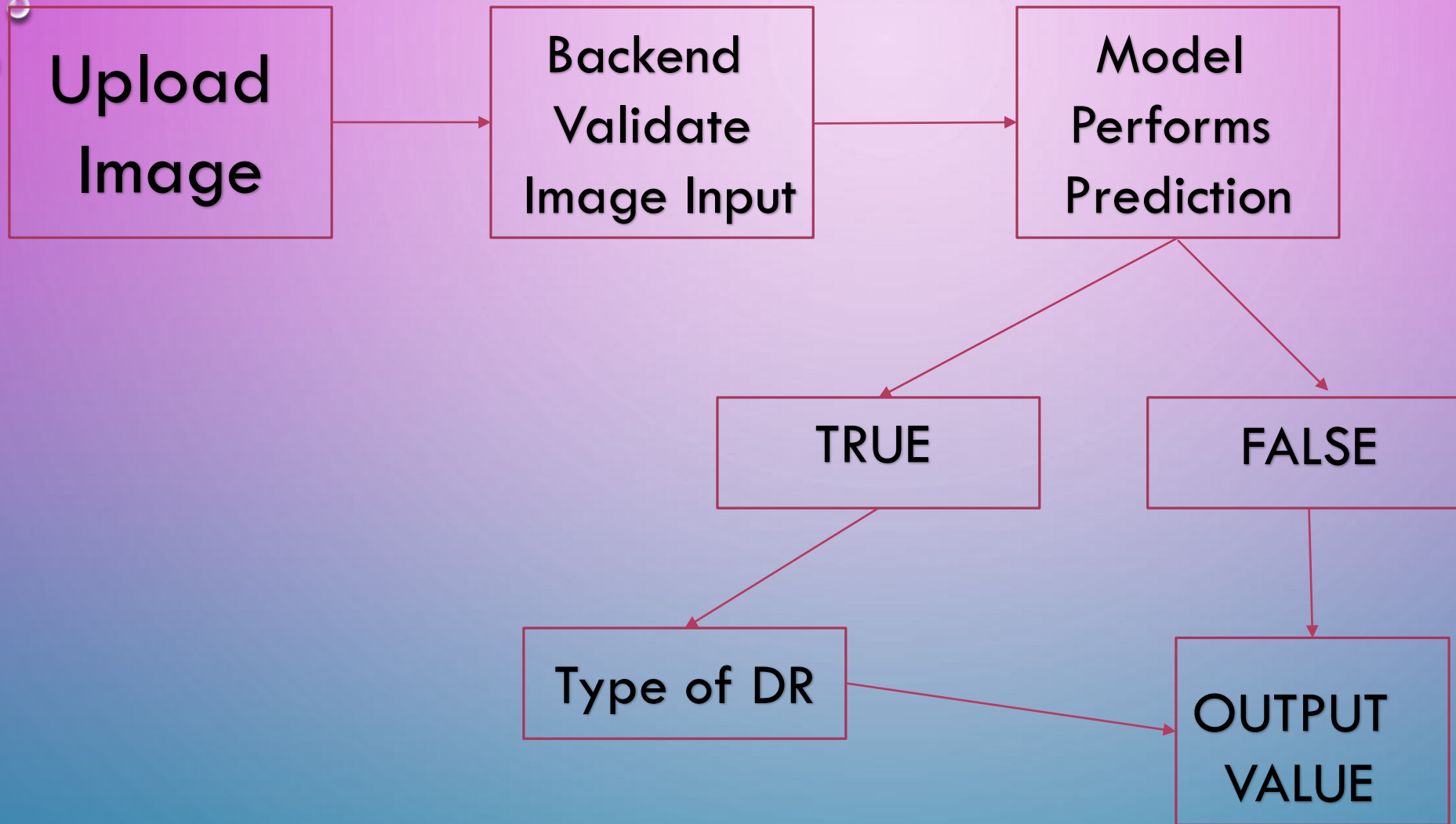
EVALUATION OF STUDY

- Many Ophthalmologists Trained In Nigeria Are Found Working In Well-established Eye Hospitals In The World. However, Majority Of Them Still Concentrate Their Practice In The Urban Area Of Nigeria Leaving 80% Of Rural Populace To Travel Many Kilometers To Access Specialized Eye

- The need of a technician to check the model been built and the metric score to see how efficient the model was and if it can be relied on for use without the need of cross checking results it produces

- Deploying the model been built it can be embedded in electronics i which are used the medical centres as ths would leverage tinyml (A field of using AI in embedded systems)

CONCLUSION

Using Artificial intelligence for solving problems has become the new way as this is meant to automate and reduce the tedious process of how works can be carried out hence leveraging this technology in various field ha proved to become success as most top companies in the field of medicine has used this tools to achieve ground breaking solution i.e Retina AI(Ophthalmology), Deepmind(alpha fold). The deep learning model is been trained to be able to accurate classify an image provided if it falls into any of the class and we leverage the use of transfer learning to reduce the time of building an architecture from scratch, and the metric of evaluation was the kappa and a kappa score above 0.85 is considered a good model. Some challenges poised due to the use of Ai on ethical issues and how to solve or prevent such has been stated in the previous slides as this is a simple approach to implement an Artificial Intelligence System in the Field of Ophthalmology

Thank You For your Time