AI to Prevent Vision Loss for Millions Globally

Arun Shroff, Co-founder, Medindia.net
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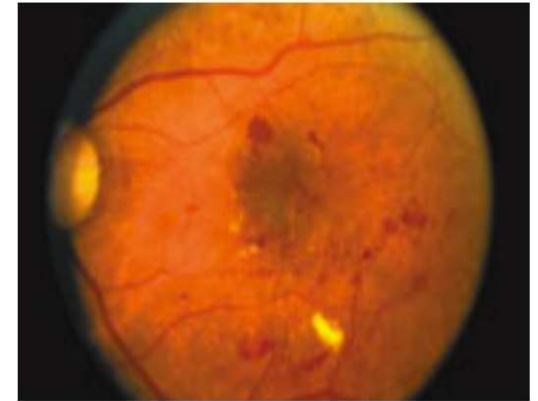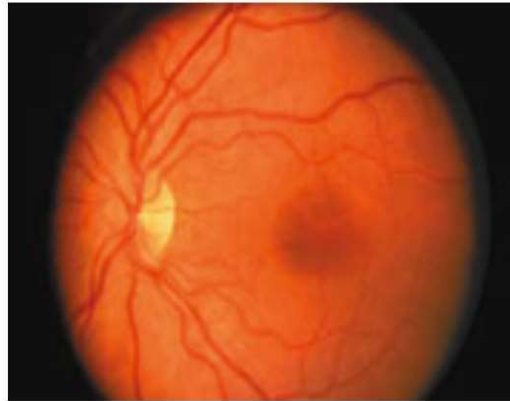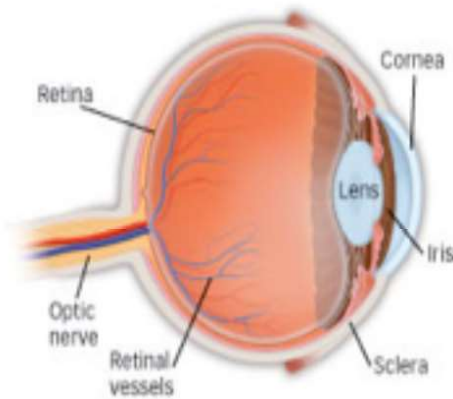
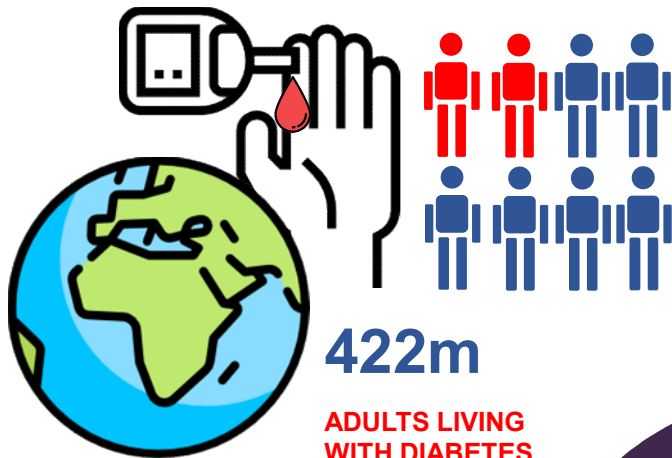**@arunshroff   #AIforGood**

Empowering
Better Health

The Problem

Diabetic Retinopathy (DR)

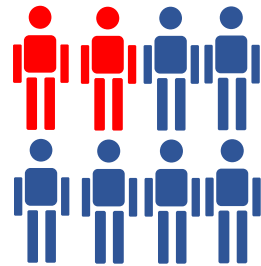**Diabetic Retinopathy (DR) is the fastest growing cause of blindness worldwide**

The Diabetes Epidemic

422 million people worldwide suffer from diabetes

422m
ADULTS LIVING WITH DIABETES

642m
ADULTS LIVING WITH DIABETES

YEAR 2015

YEAR 2040

148m (35%)
HAVE SOME FORM OF DR

42m (11%)
HAVE VISION-THREATENING DR
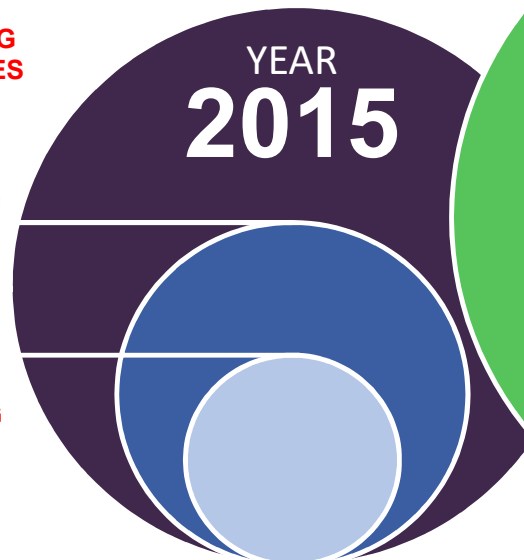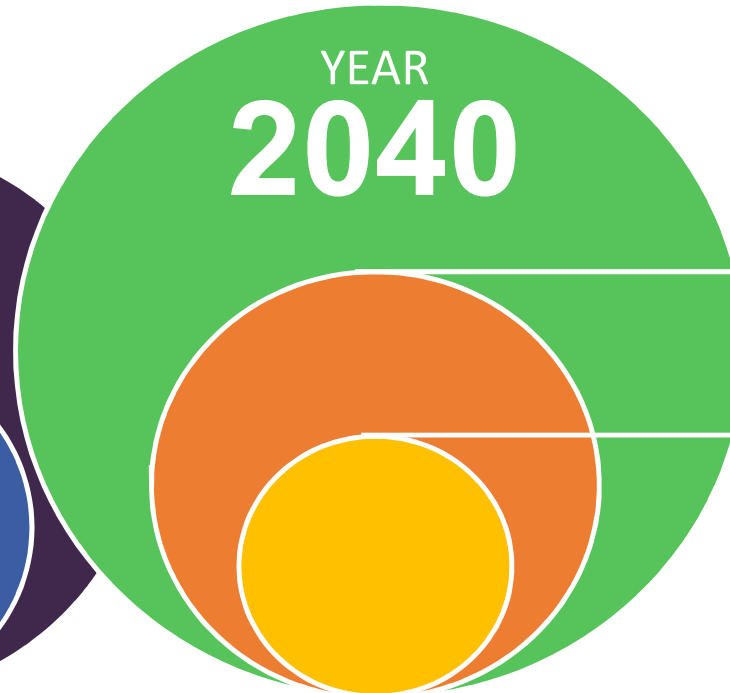
(35%) **225m**
HAVE SOME FORM OF DR

(11%) **64m**
HAVE VISION-THREATENING DR

http://www.who.int/mediacentre/factsheets/fs312/en/

Detection & Diagnosis of DR

Eye Exam by a trained eye-care specialist using Fundus Camera

Without DR	Early Diabetic Retinopathy	Mild NPDR*
Moderate NPDR	Severe NPDR	PDR and Neovascularization
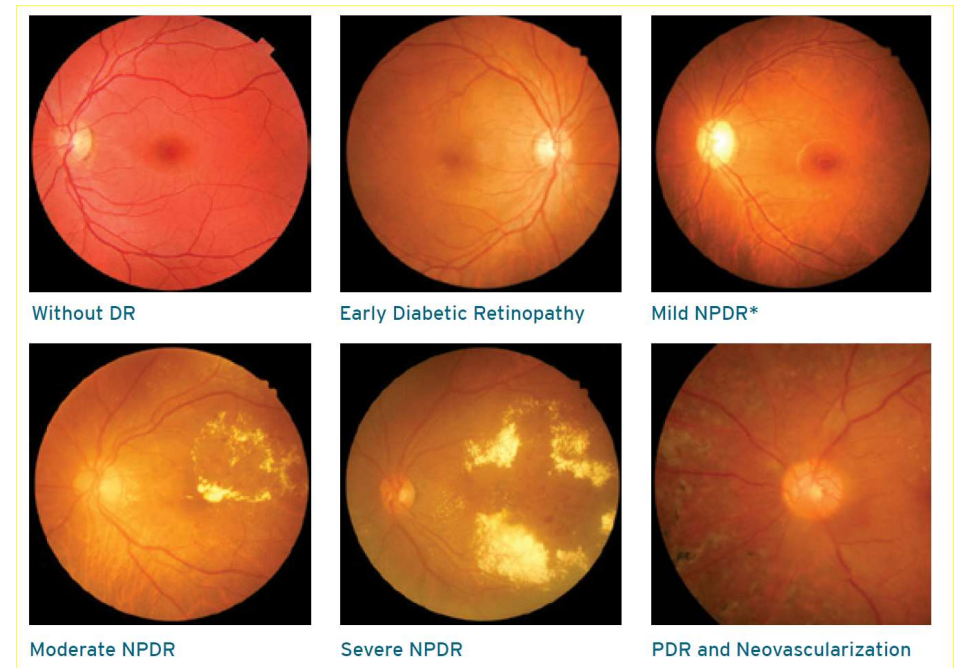
Diagnosis by manual examination of images for DR

Acute Shortage of Ophthalmologists

200,000 total ophthalmologists worldwide

Ophthalmologists per Million Population	Countries
0 to 0.99	23
1 to 3.99	30
4 to 24.9	48
25 to 99.9	74
100+	18

➢ Somalia: 4 for 17.5M ; Niger 7 for 20M; Angola : 15 for 28M
➢ India : 15,000 for 1.3B = 9 per million

Resnikoff S, Felch W, Gauthier T-M, et al. Br J Ophthalmol (2012). doi:10.1136/bjophthalmol-2011-301378

How AI Can Help

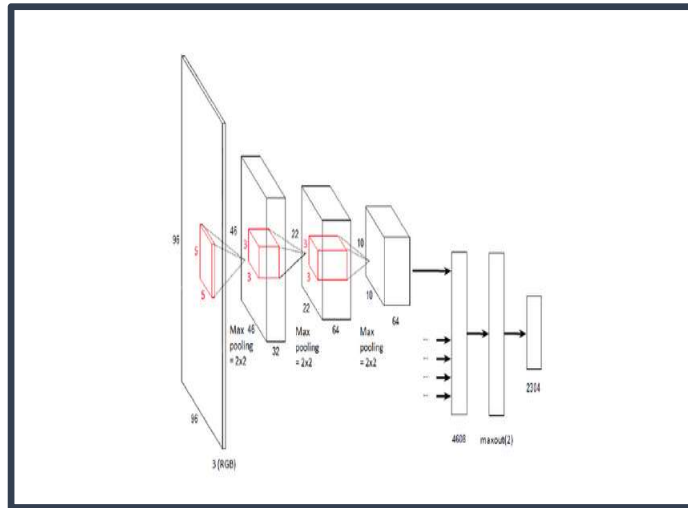**Patient's Retina Image via Fundus Camera/Low Cost Device**
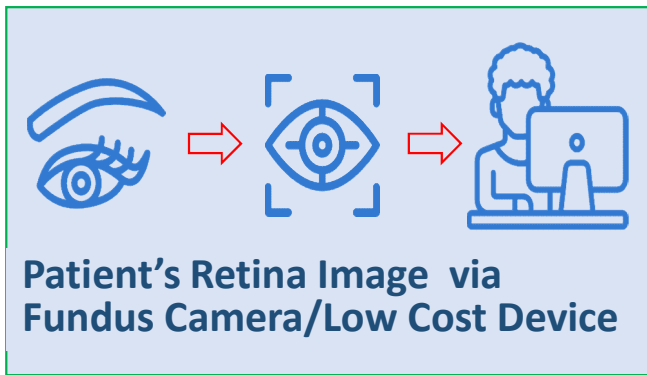
Input Images From Low-cost Device

AI Deep Learning CNN Model

Diagnosis probabilities

Mild DR (96.2 %)
Moderate DR (2.8 %)
Severe DR (0.7 %)
Normal (0.3 %)

Output Diagnosis with Probabilities

In 2016, Google's DR Detection AI model had an accuracy score of 0.95 - on par/better than median of 8 ophthalmologists at 0.91
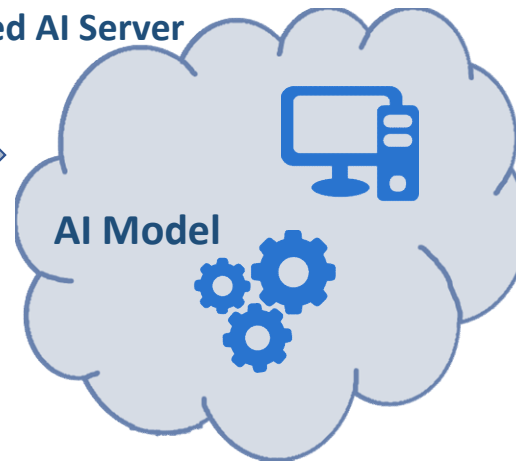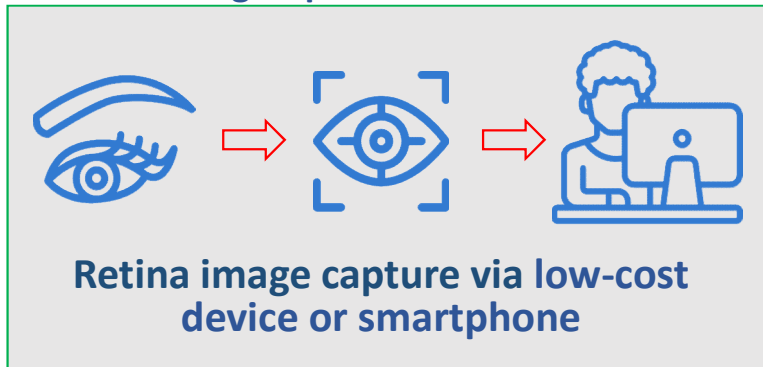
Ref: https://ai.googleblog.com/2016/11/deep-learning-for-detection-of-diabetic.html

Overview of Proposed Solution

Low Cost
Easy to use
AI based
Deploy Remotely

Cloud Based AI Server

AI Model

Image Uploaded to Cloud & Processed

Retina image capture via low-cost device or smartphone

Clinics / Screening Kiosks

Diagnosis Report sent to patient

AI Diagnosis

Validate images to improve model

Pilot in partnership with tele-ophthalmology group in India with over 150 centers

Remote Ophthalmologist Verify/Validate Diagnosis

Next Steps

Challenges:

- Curated Datasets
- Low Cost + High Accuracy
- Remote Deployment
- Privacy & Regulations

What We Need:

- Partners for collaboration
- Resources for scale-up and deployment

"We believe that It is feasible to use AI to solve the global healthcare challenge of detecting Diabetic Retinopathy and prevent blindness for millions globally.

And that would truly be AI for good!"

Thank you!

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@arunshroff   #AIforGood