AI to Prevent Vision Loss for Millions Globally



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Empowering Better Health



Diabetic Retinopathy (DR)



A complication of diabetes that damages the retina and leads to impaired vision and vision loss.

Diabetic Retinopathy (DR) is the leading cause of blindness among working-age adults worldwide

The Diabetes Epidemic



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

Detection & Diagnosis of Diabetic Retinopathy



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



Without DR







Mild NPDR*





Moderate NPDR

Sev

Severe NPDR

PDR and Neovascularization

Diagnosis by manual examination of images for DR



How AI Can Help



Retina Input Images from Camera

An AI Deep Learning CNN Model

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

Objectives of Project

- End-to-end solution to automate DR detection
- Meet medical standards for acceptable levels of diagnostic accuracy
- Able to be deployed and used remotely
- Scalable to thousands of locations
- Comply with local laws and regulations
- Portable, low cost, easy to deploy, use, maintain

Overview of Our Solution





- Partnership with national teleophthalmology group
- 275 centers in 22 states
- 25,000 Patients screened / month
- 50,000 to100,000 images screened /month
- National network of remote clinicians
- Al Trained to acceptable levels of accuracy (90% accuracy)
- Cloud based Al solution completed & in beta testing

The AI Model in Action

	Xtend.Ai = 🖂	AU	
æ	Response:	< >	
*	Administrator cannot save a report. Only Doctors can edit and save the report.	Diagnosis - Both Eye	,
<u>i</u>	Left Retina	Diagnosis - Right Eye	
₹	Include in Report? Saturation 0 Brightness 0 Contrast 0	~	. >
©	AI Diag Probabilities:	Diagnosis - Left Eye	·] ~
₽	Normal 2%	Advised Referral to Ophthalmologist?	~
₹	Retinopathy 96% Nongradable 1%	Type any other anterior segment/Fundus diagnosis/Referral instructions	~
4			<u>.</u>
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•	The second s		ł
		Submit to Technician	
		Escalate to Admin Convey any specific instructions regarding this patient to the	
	Please click here to enlarge the image	Admin	\sim
			d
		Submit to Admin	
		Convey any specific instructions regarding this patient to the	

Challenge #1 : Accurate Data







Challenge #2 : Speed/Scalability



















Challenge #3 : Compliance



Standards / Benchmarking

- Acceptable accuracy levels
- Benchmark against standards WHO
 FGAI4H

Privacy / Security of Data

- Informed consent & confidentiality
- Encryption & anonymization
- Data Security

Legal / Medical Regulations:

- India : CDSCO Certification
- USA : FDA / HIPAA
- EU : EMA

Challenge #4 : Remote Deployment

Fundus Camera Size & Costs



Non-portable / Desktop Models

- Costs: ~ \$1000 to \$5000+
- Mydriatic 30° to 45° FOV
- Clinically approved

Portable / Handheld Models

- Costs : ~ \$200 to \$400
- Non-mydriatic no-dilation
- Limited 30° FOV
- Needs to be clinically validated

Next Steps

- Finish beta testing & field trial of software
- Complete smartphone based imaging device
- Validate against external standard / benchmarks
- Obtain any required certifications
- Partner for collaboration in other regions
- Resources / Funding for scale-up and deployment

AI For Global Good

"We believe that It is feasible to use AI to solve the global healthcare challenge of Diabetic Retinopathy and prevent blindness for millions globally. And that would truly be AI for Global Good!" Thank you!

Arun Shroff

www.xtend.ai



