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# Peak **Blinders**

“Eliminate needless blindness!”

*–Dr. Venkataswamy*



# Diabetic Retinopathy Detection

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# What is Retinopathy?

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- Retinopathy is a condition which develops in the eye, which if not treated at early stages, could lead to **permanent blindness**.
- A major contributor towards this condition is diabetes and **delayed diagnosis!!!**

# Why do we care?

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- India is said to be the **diabetic capital** of the world by 2030 with over **80 million** people affected by it.
- Unfortunately, more than **2/3rds** of them are from the “*subaltern*”.
- If identified early, this is a **blindness** which can be **avoided**.

# How are we caring?

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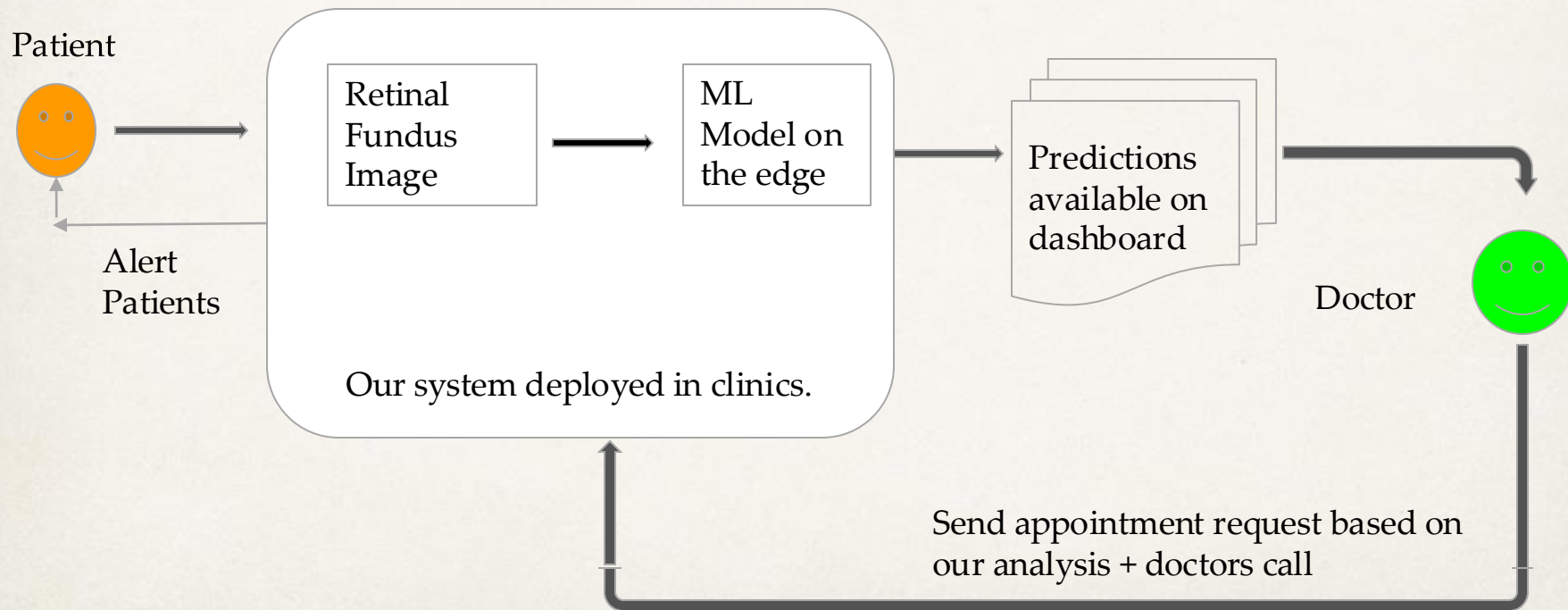
- A ML model on the edge, with focus on **privacy**, **scalability** and **interpretability**.
- Matching cases based on **severity** and **time** for immediate diagnosis.

# Who is our product intended for?

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- For rural areas (Tier 4 cities), which has small dispensaries and can afford a fundus camera, but **don't have expert** medical professionals available.
- A **tool** for doctors to prioritise cases based on the severity of the condition.
- For anyone who wants to make healthcare affordable and accurate.

# Process Overview





# Model Overview

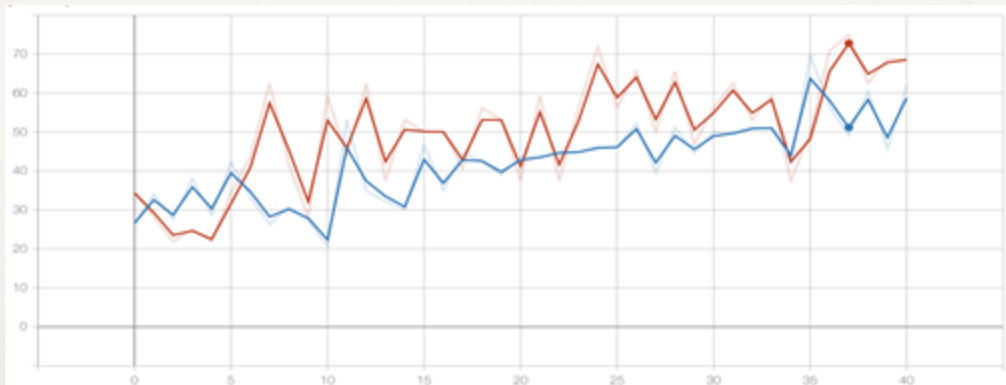
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- Mobilenet\_v2 backbone
- Fully Connected Network
- GradCAM Score matching for heatmaps
  - Better interpretability of models
- Future: Self attention layers to remove CNN from the picture, thereby cutting model params by 10x

# Current Progress

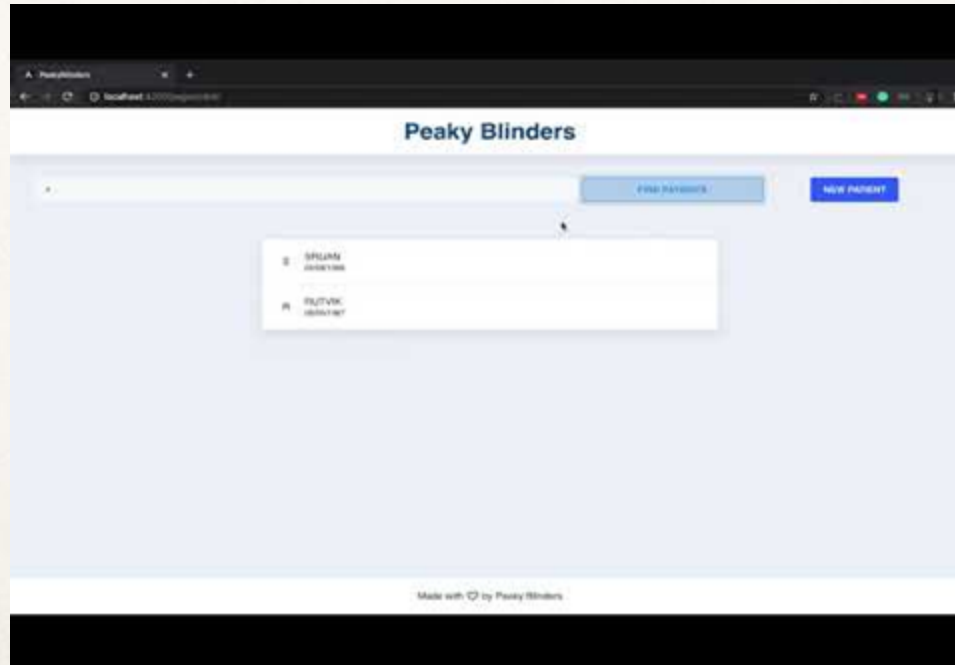
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- Accuracy of **68%** on a production data of **103** images for the base-model. Model was trained on **440** images.
- A web-based system for interaction of doctors with clinics.

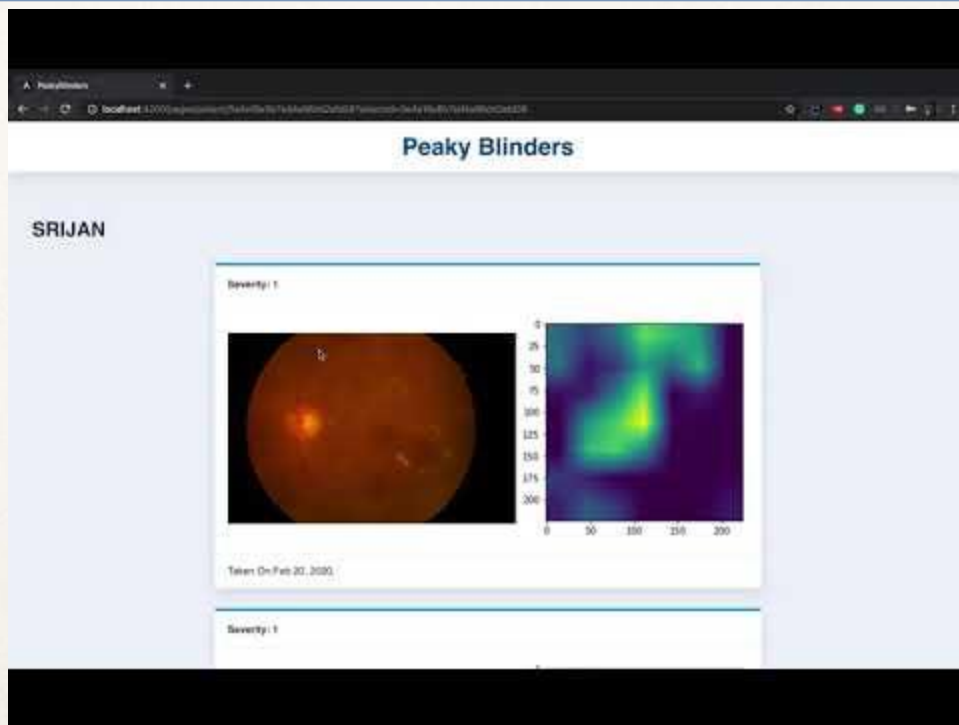


# Demo (Clinic View)

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# Demo (Doctor View)



# Business Plans

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- **Profit sharing**, by helping in public **health care campaigns**, with local hospitals
- Charging a very **nominal amount** for using the software at dispensaries.
- “Your data is only your data *none of our data ;-)*”

# Future Directions:

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- **Deploy** on edge devices
- Predict **more** than 5 stage diabetic retinopathy, like other biological conditions based on the retinal image.
- **Split Learning** and **Differential Privacy** to preserve privacy.
- **Weak Supervision** and **Meta Learning** algorithms can be used to deploy this for a larger set of images.

# Thank You

“Any significant advancement in computer science will be indistinguishable from magic!”

*–Arthur C Clarke*