

Image classification using CNN for Diabetic Retinopathy

BY: Carlos Marin

Outline

Background

Business Problem

Data

Methods

Results

Conclusions



Background

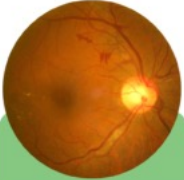




What is Diabetic retinopathy?

- Diabetic retinopathy is disease of the eyes
 - Caused by high blood sugar
 - Affects blood vessels
 - Loss of vision
 - Measured by disease proliferation
- Affects people with diabetes
- Found in 4.1 million people
 - roughly 1/29 diabetics
 - 1/3 are African-American and Mexican-American

Background

What is Diabetic retinopathy?

Diabetic Retinopathy Classification

				
No disease visible	Mild nonproliferative diabetic retinopathy (NPDR) Localized swelling of the small blood vessels in the retina (microaneurysms)	Moderate NPDR Mild NPDR plus small bleeds (dot and blot haemorrhages), leaks (hard exudates) or closure (cotton wool spots) of small blood vessels.	Severe NPDR Moderate NPDR plus further damage to blood vessels (interretinal hemorrhages, venous beading, intraretinal microvascular abnormalities).	PDR New vessel formation or vitreous/preretinal hemorrhage or tractional retinal detachment



Business Problem

- We are building a deep learning model to detect the various levels of diabetic retinopathy



Business Problem

Why?

- Medical misdiagnosis caused by varying levels of knowledge and experience.
- Ensuring proper diagnosis for medical professional



Data

- Data is created by TensorFlow
- Contains images 35,000+ images of different levels of diabetic retinopathy.



Methods

- Images imported from directory
- Baseline model created for comparison
- Model evaluation

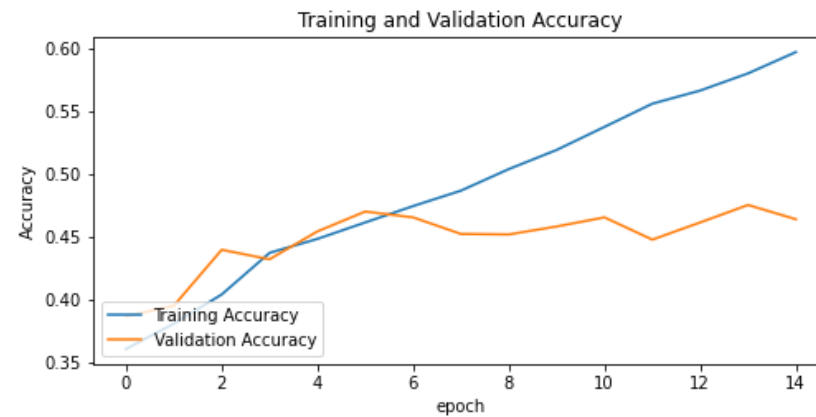


Methods

- Using transfer learning, instantiating pre-trained model as base
- Adding the base model to final model
- Model evaluation

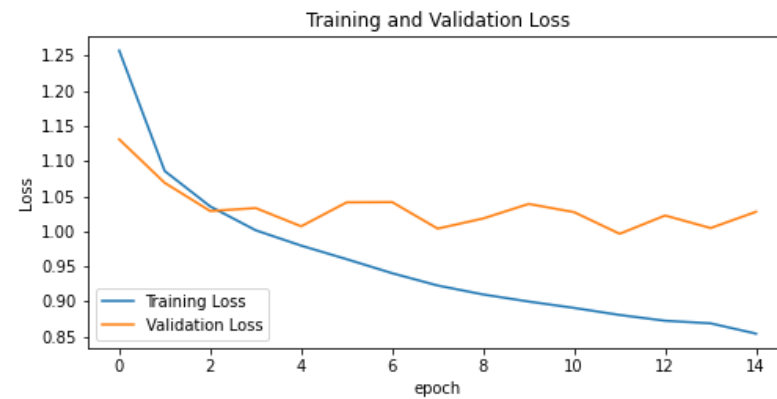
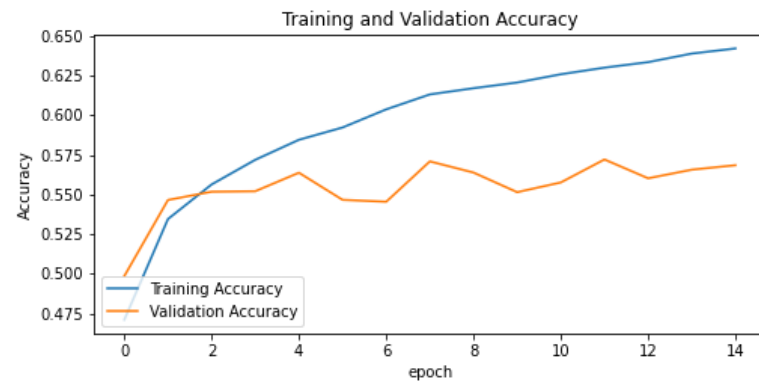
Results

Data Visualization of initial model performance



Results

Data Visualization of model with transfer learning performance





Summary of Findings / Conclusion

- The end accuracy after running the model is 68%
- Overfitting occurs in both models
- Transfer learning greatly improves model performance



Next Steps...

Next steps...

- 1) Build Deep Learning models to other ocular diseases (e.g., Diabetic Macular Edema)
- 2) Pursue other areas of medicine, where we can track disease progression. (e.g., Cancer metastasis)
- 3) Use Deep learning to build models for disease detection (e.g., Pneumonia)



Thank you!