



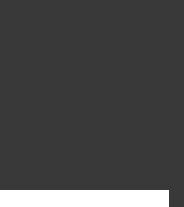
Here's Waldo!

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Objectives

- Build an A.I. which can find Waldo on a Where's Waldo? Page

1) Utilize previously made image classification models and generate new and improved models

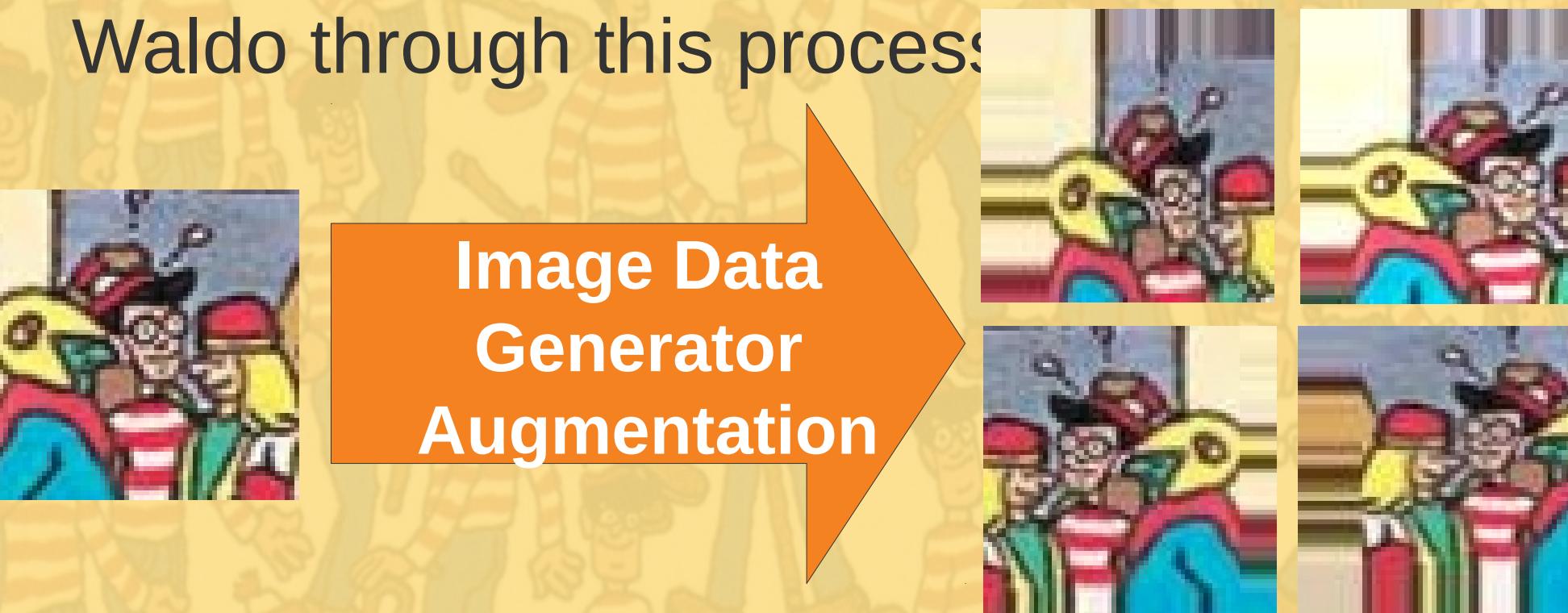
2) Build a Flask application and deploy it with Docker on a AWS EC2 and have it able to interface with smartphones.

Data

• Data consisted of 10,000 total images of 64x64 pixel size. 5000 of Waldo and 5000 of not Waldo.

• For my current model I took the incorrect predictions from the old model and added them to previous data-set to train my new model. This was around 6900 extra non-Waldo pictures

• Due to a huge class imbalance I had to generate a bunch of extra pictures of Waldo through this process:



Tech Stack



Initial Model



Current Model



Results

Current Model on Holdout Data



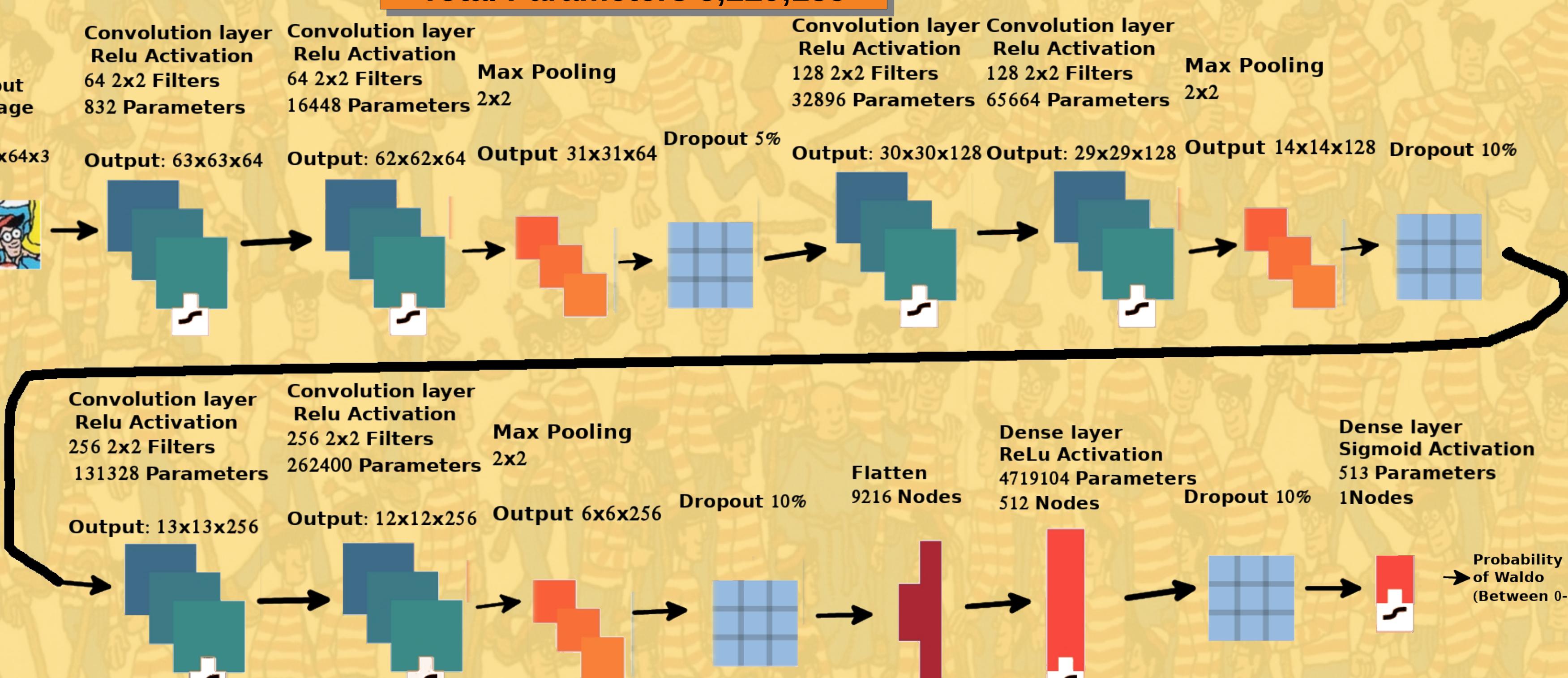
Model

Convolutional Neural Network

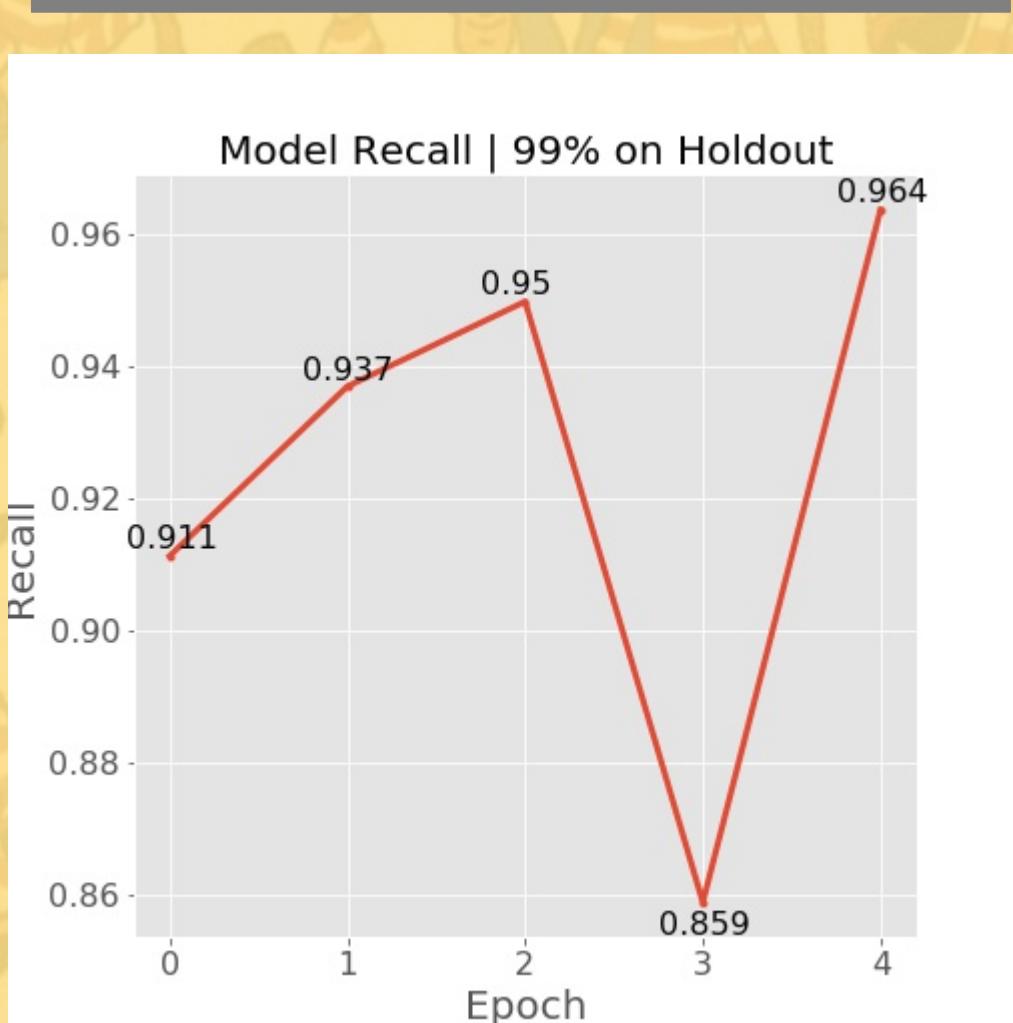
A model that is most commonly used for extracting multi-dimensional features from images for classification.

Model Structure

Total Parameters 5,229,185



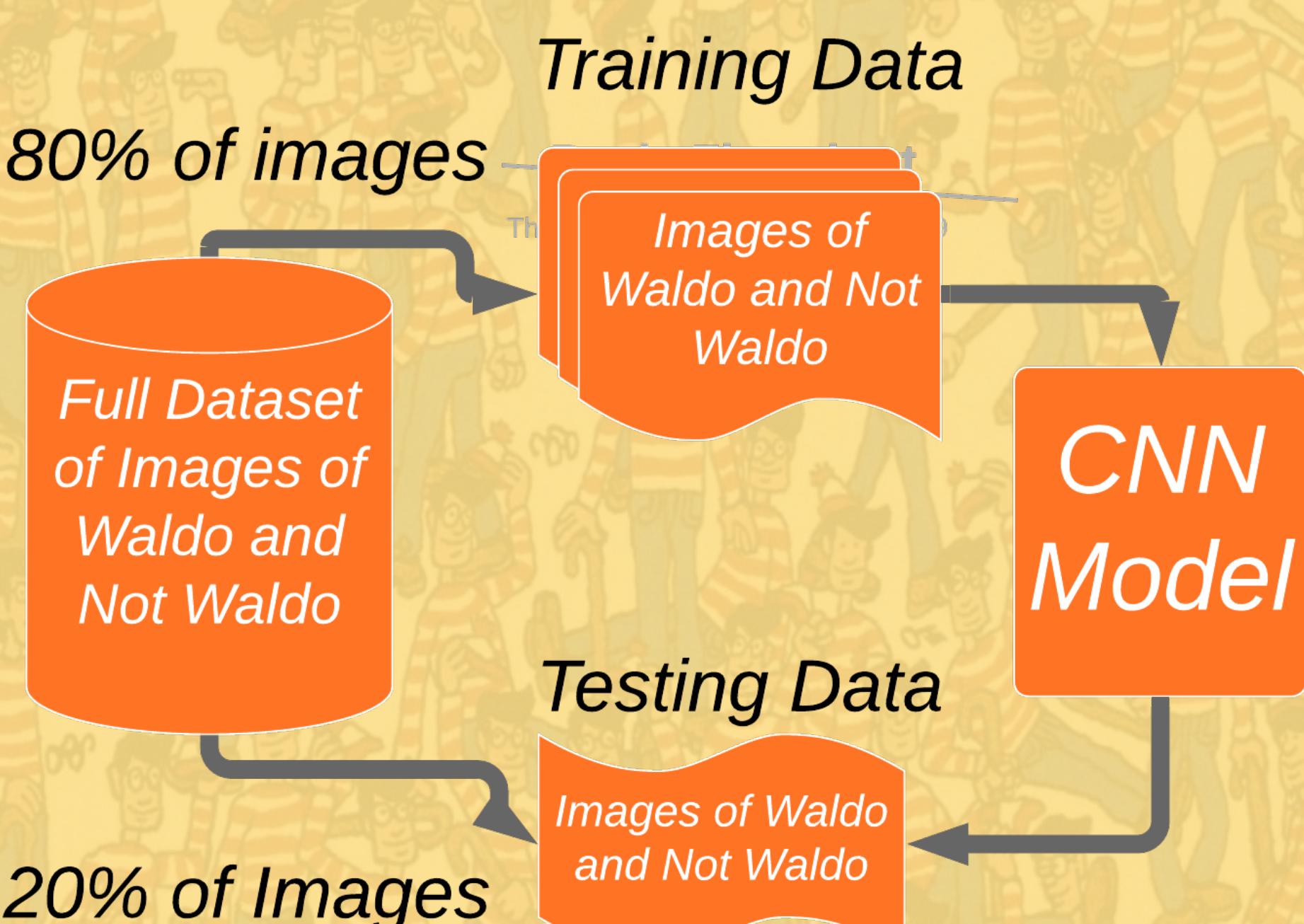
Model Results



Conclusion

- This method, though relatively accurate, does take a significant amount of time to complete.
- More layers and more filters seemed to help the model tremendously.
- Cross validation determined the optimal "Is Waldo" probability threshold was 65%.
- The model seemed to rely on a face and a presence of red and white to classify a window as Waldo.

Pipeline



References

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- Constantinou , Valentino : vc1492a, 2018, Hey Waldo, V1.8, Github, <https://github.com/vc1492a/Hey-Waldo>
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Sumit Saha - <https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1184a59>
- Handford, Martin. Where's Waldo? * Somerville, MA : Candlewick Press, 2007.
- Ennui ~ Elegant Neural Network User Interface ~ Jesse Michel-Zack Holbrook-Stefan Grosser-Hendrik Strobelt-Rikhav Shah - <https://math.mit.edu/ennui/>
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(The entire collection of Where's Waldo Books was used. Scanned images of pages for data.)