



J WAYNE ENTERPRISES



# DETECTING ABNORMAL EGGS

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Capstone Project  
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# We Will Propose

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That next steps may be taken in implementing computer-based identification of abnormal electrocardiograms (ECGs)



# — Today's Agenda —

BUSINESS PROBLEM

DATA & METHODS

RESULTS

NEXT STEPS





# Business Problem

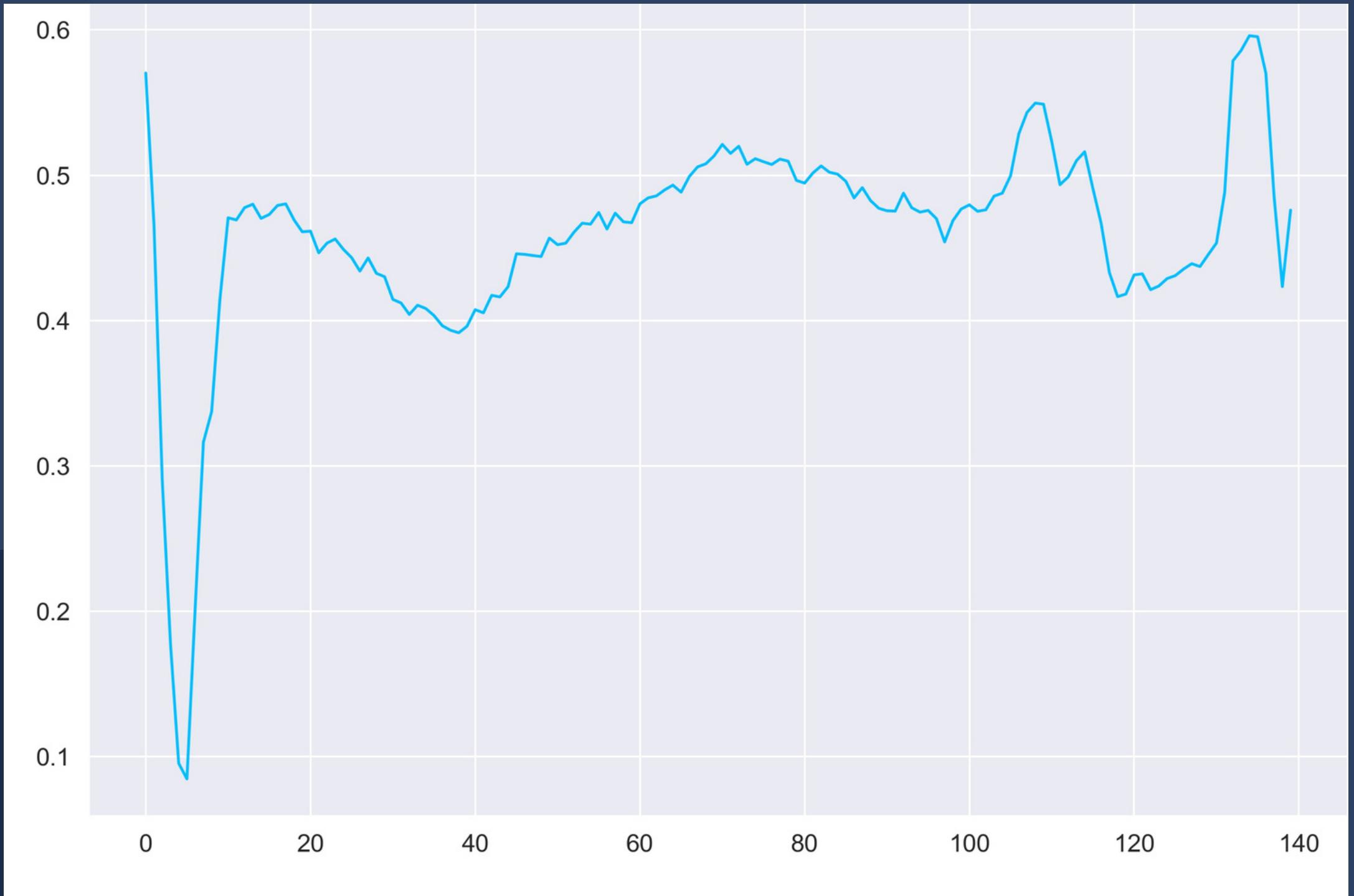
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To correctly identify  
abnormal ECGs for fast-  
tracked diagnosis



# The Data

A normal ECG from the dataset



- Contains almost 5,000 heartbeats
- 140 data points for each heartbeat
- All from a single patient with congestive heart failure
- 2,919 normal heartbeats
- 2,079 abnormal heartbeats

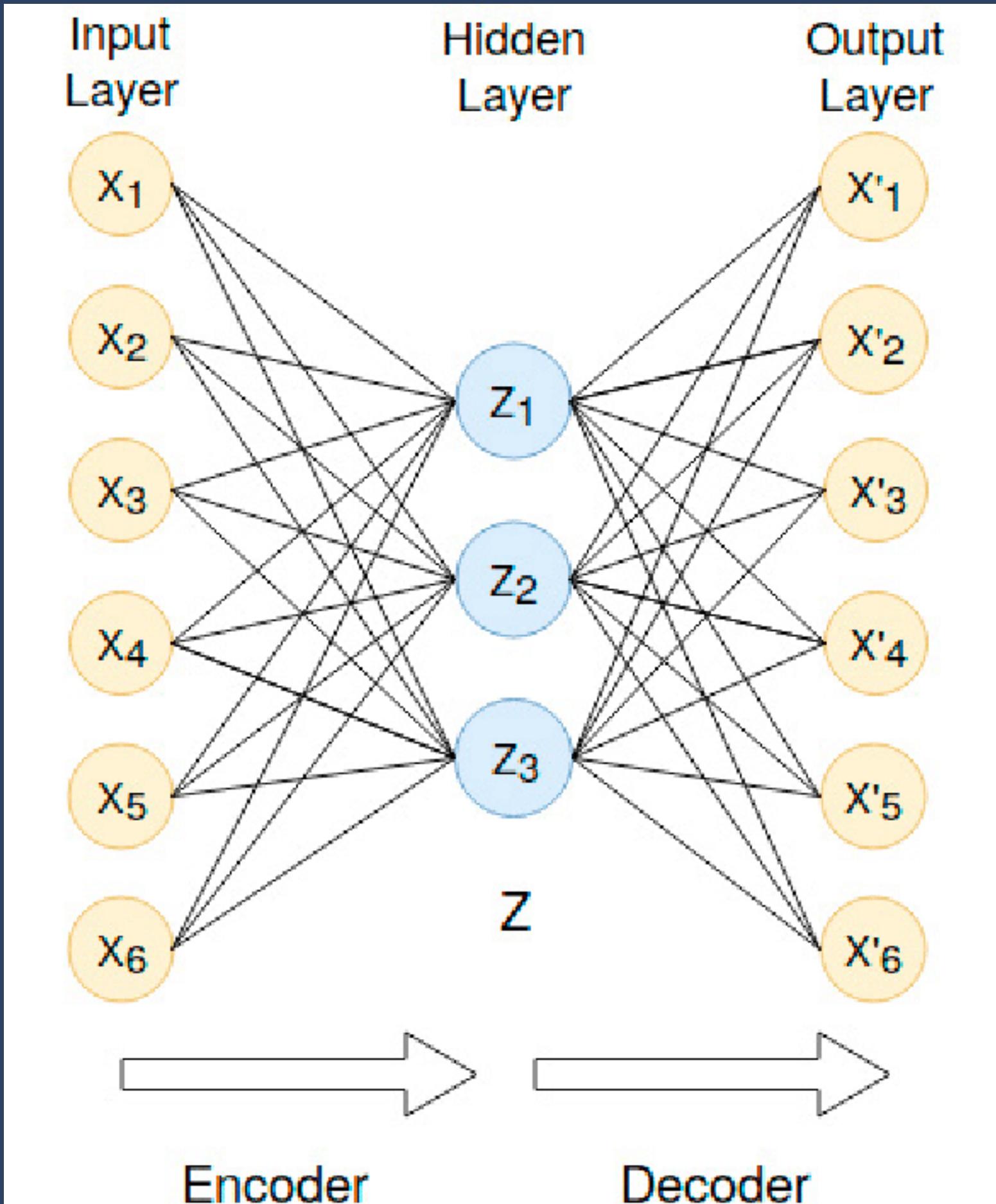
# Our Methods

- Teach the model how to recognize a normal heartbeat and reproduce it
- Present the trained model with normal and abnormal heartbeats and see if it can identify one from the other



# Modeling: Autoencoding

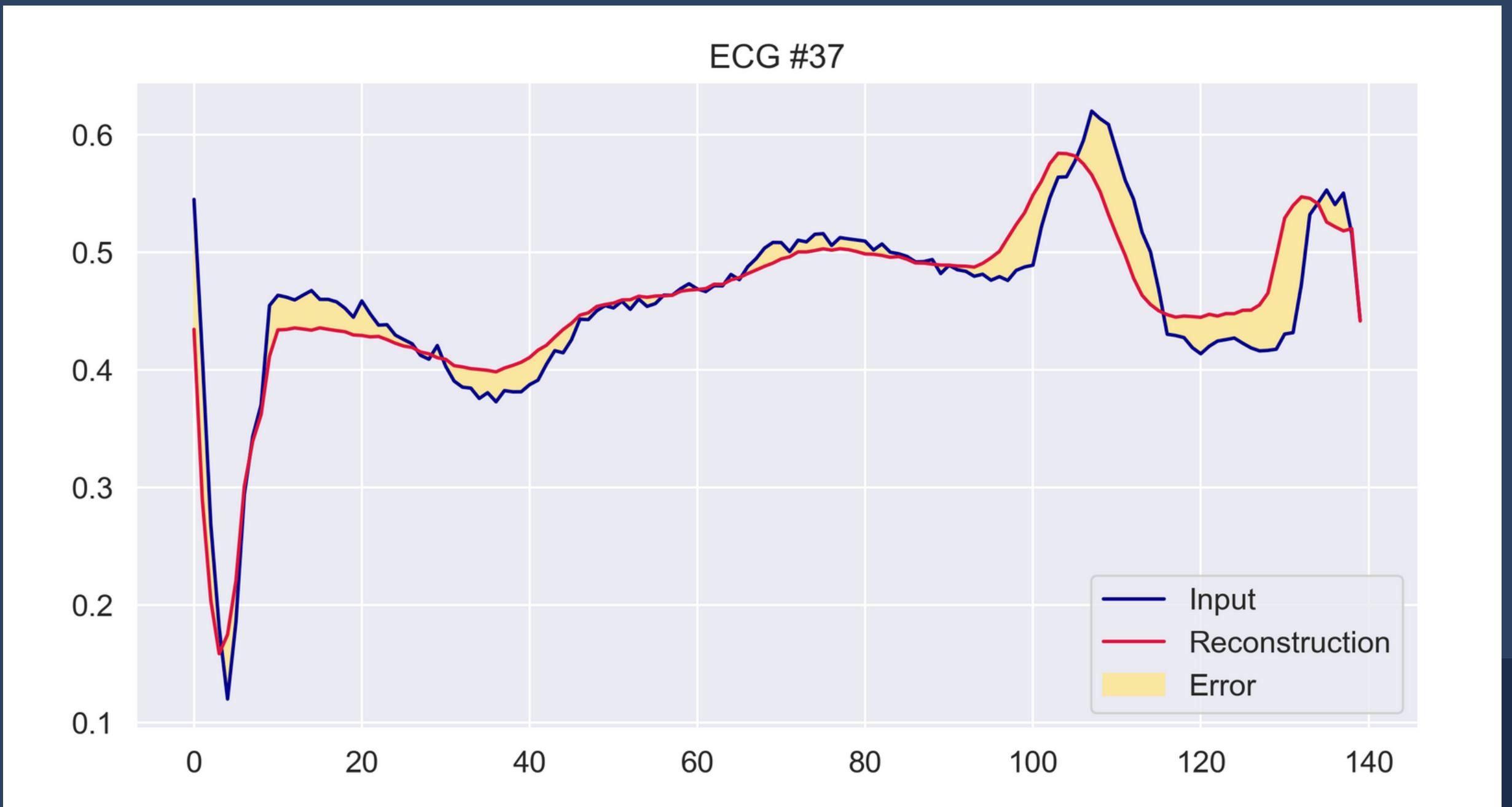
- Start with inputs
- Reduce them
- Expand them back to the same size and reproduce the original





# How It's Done - A Normal Heartbeat

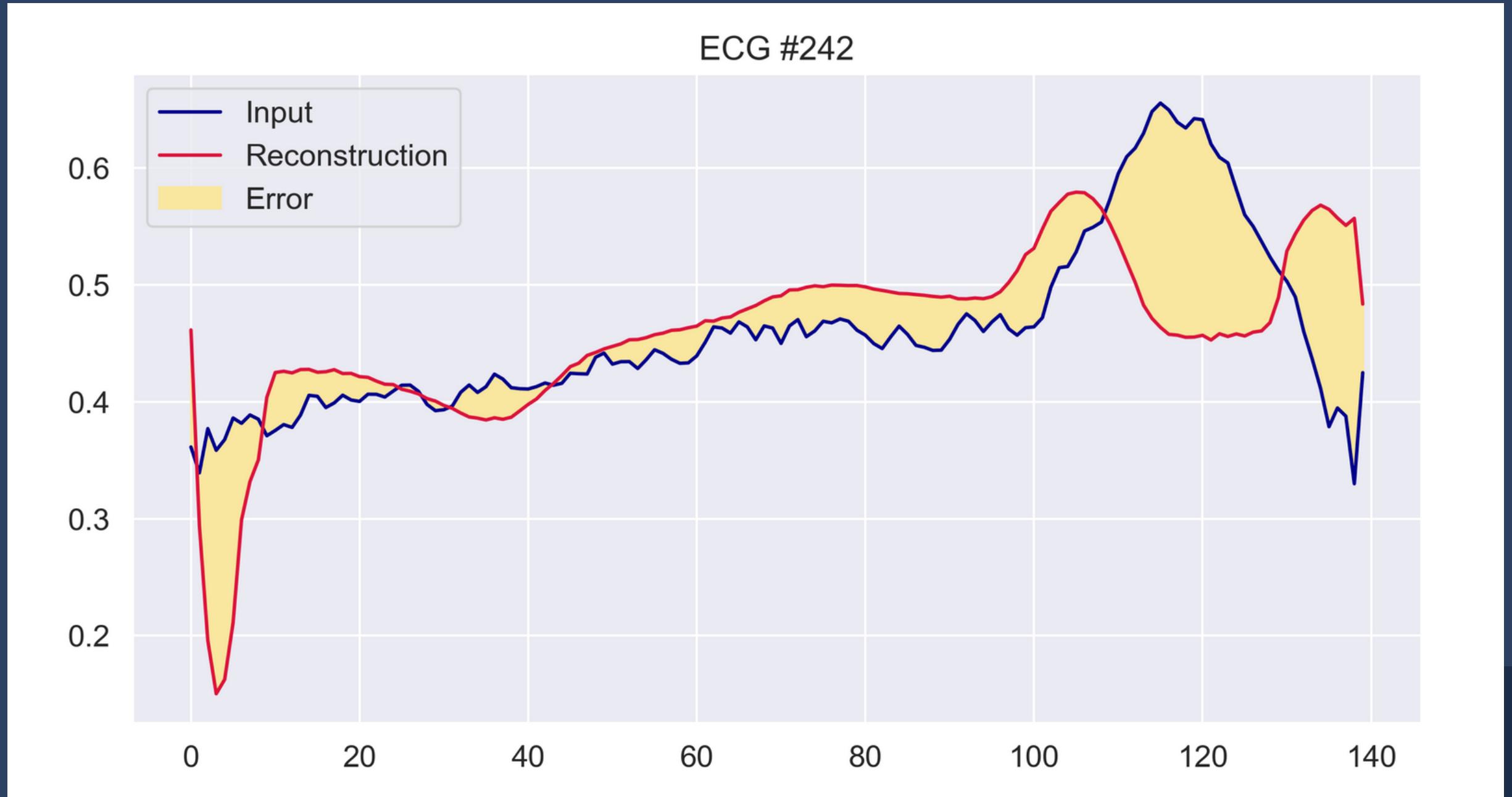
This is a normal heartbeat and the copy reconstructed by the model. The area shaded in yellow is the amount of error.



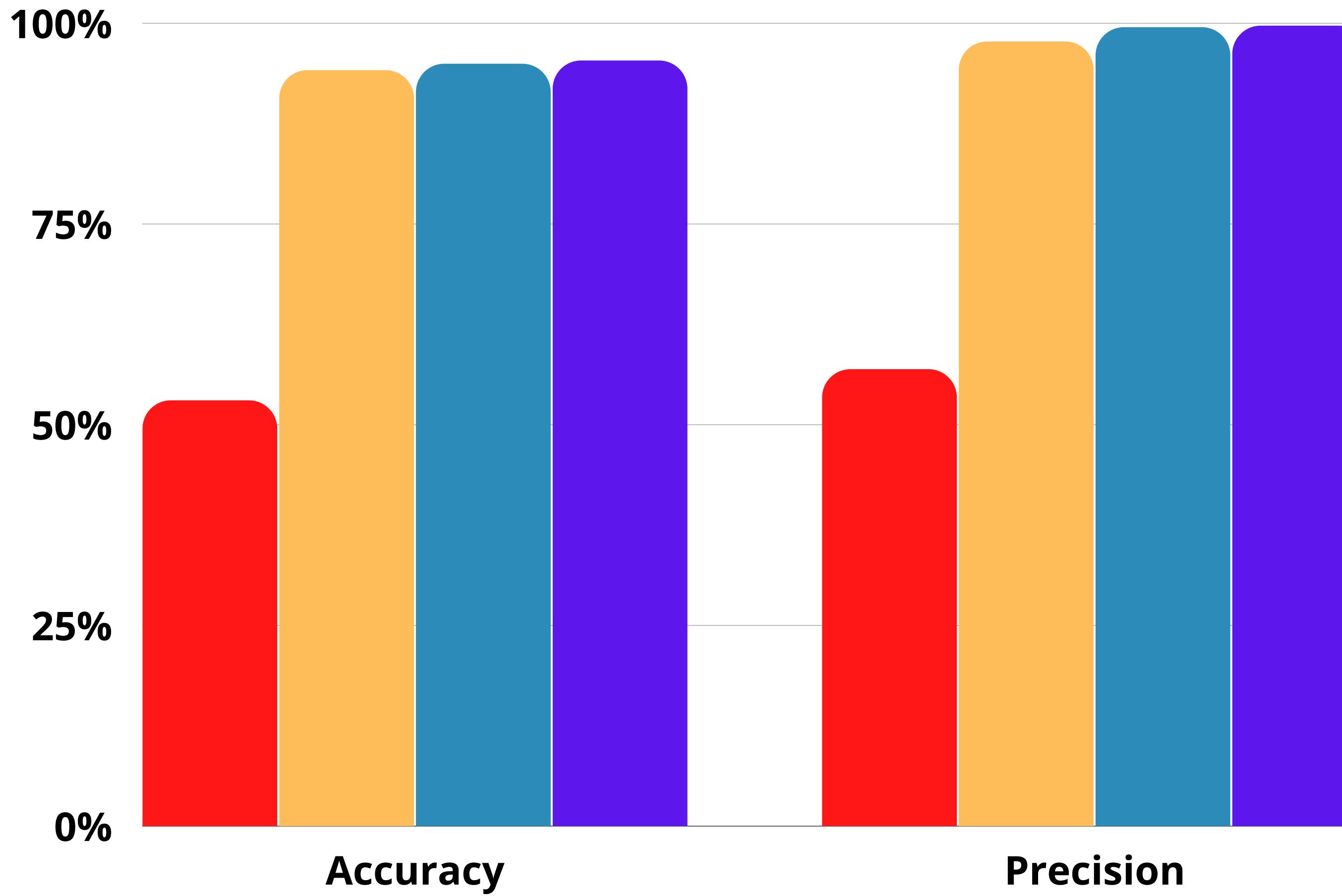


# How It's Done - An Abnormal Heartbeat

Note the greater error in the reconstruction, because it's never seen an abnormal heartbeat before!



- Baseline Model ▪ Model 2 - PCA
- Non-Linear Autoencoder ■ Keras Tuned Autoencoder

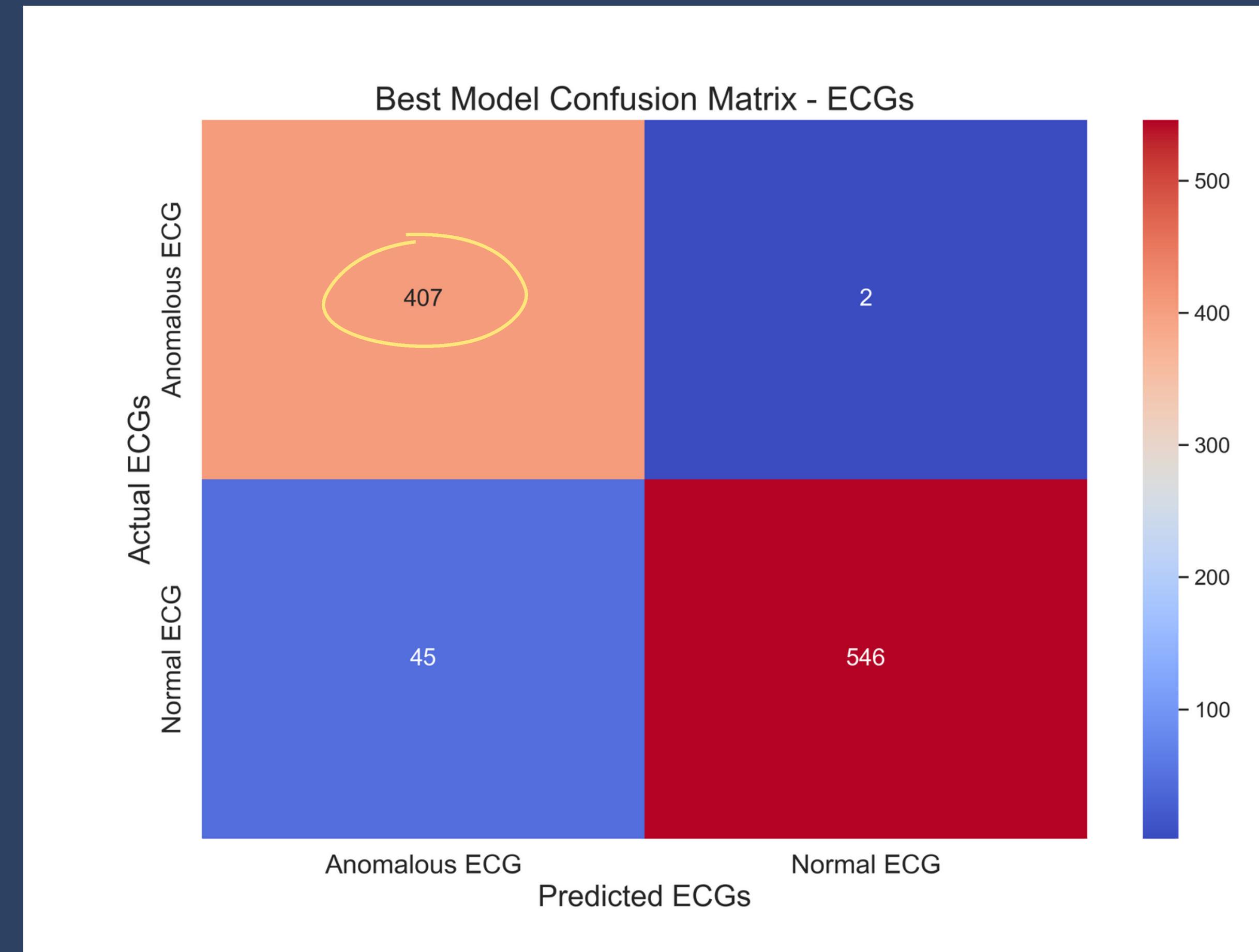


## RESULTS

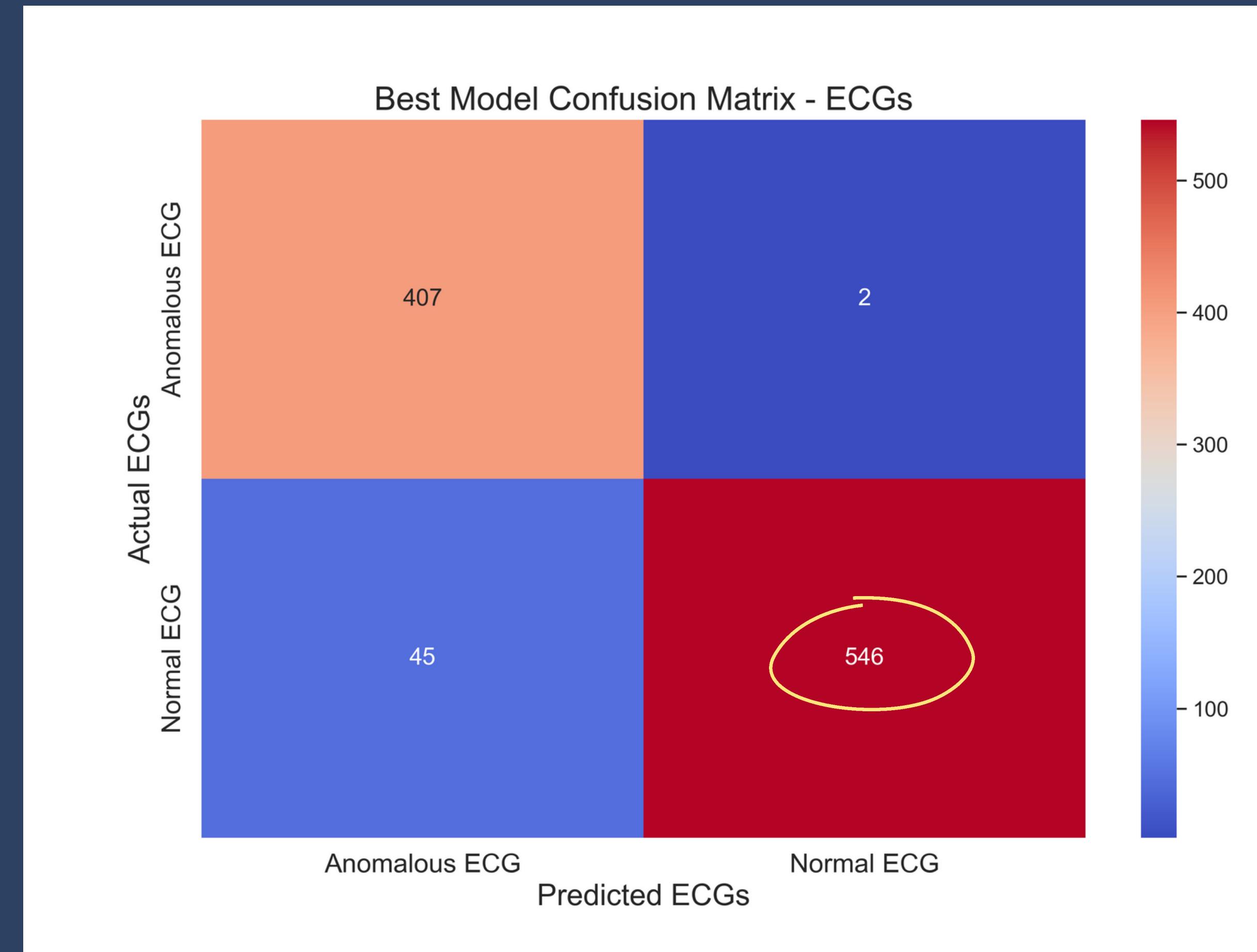
Best Model  
Accuracy - ~ 95%  
Best Model  
Precision - ~ 99%



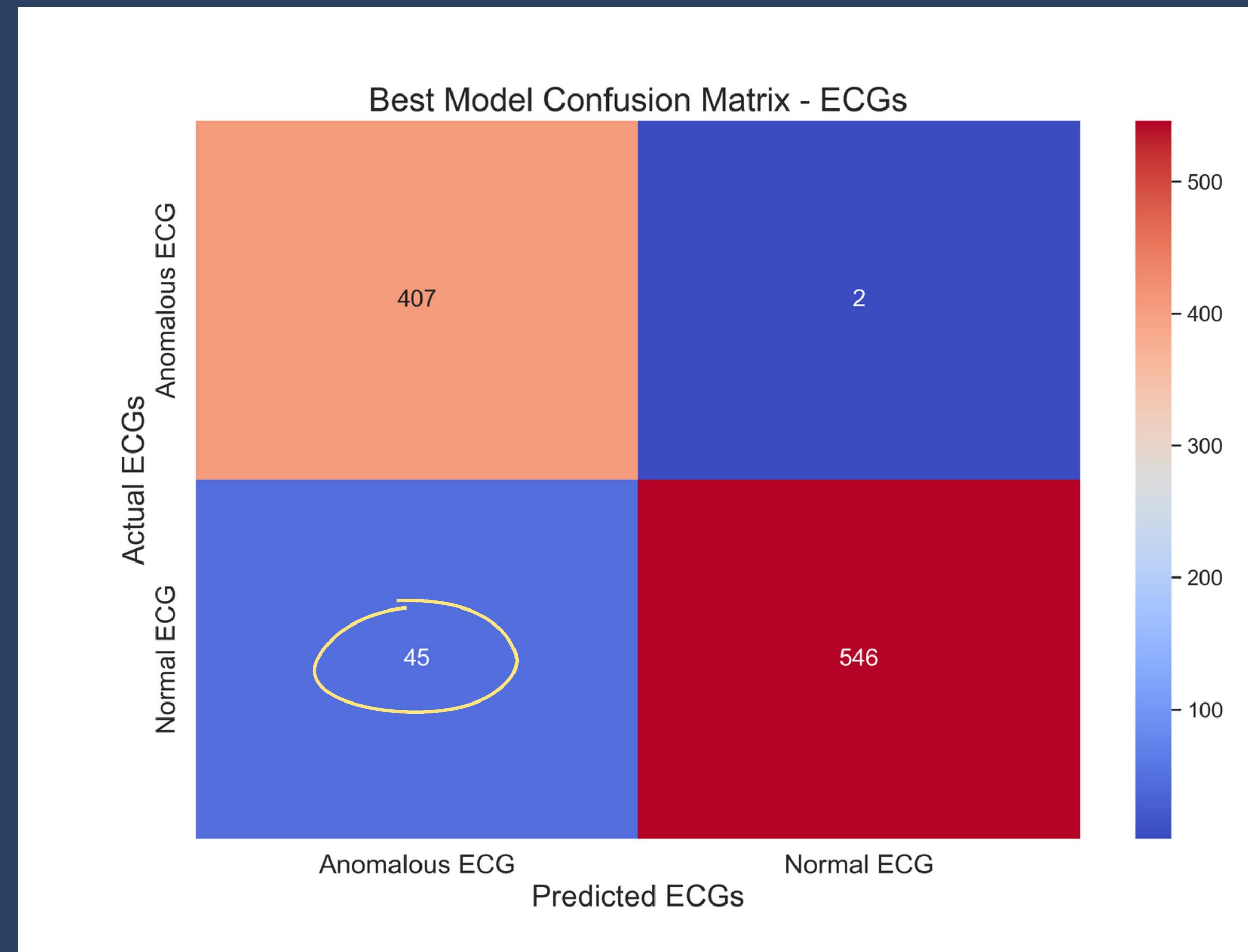
# Our Best Model Results



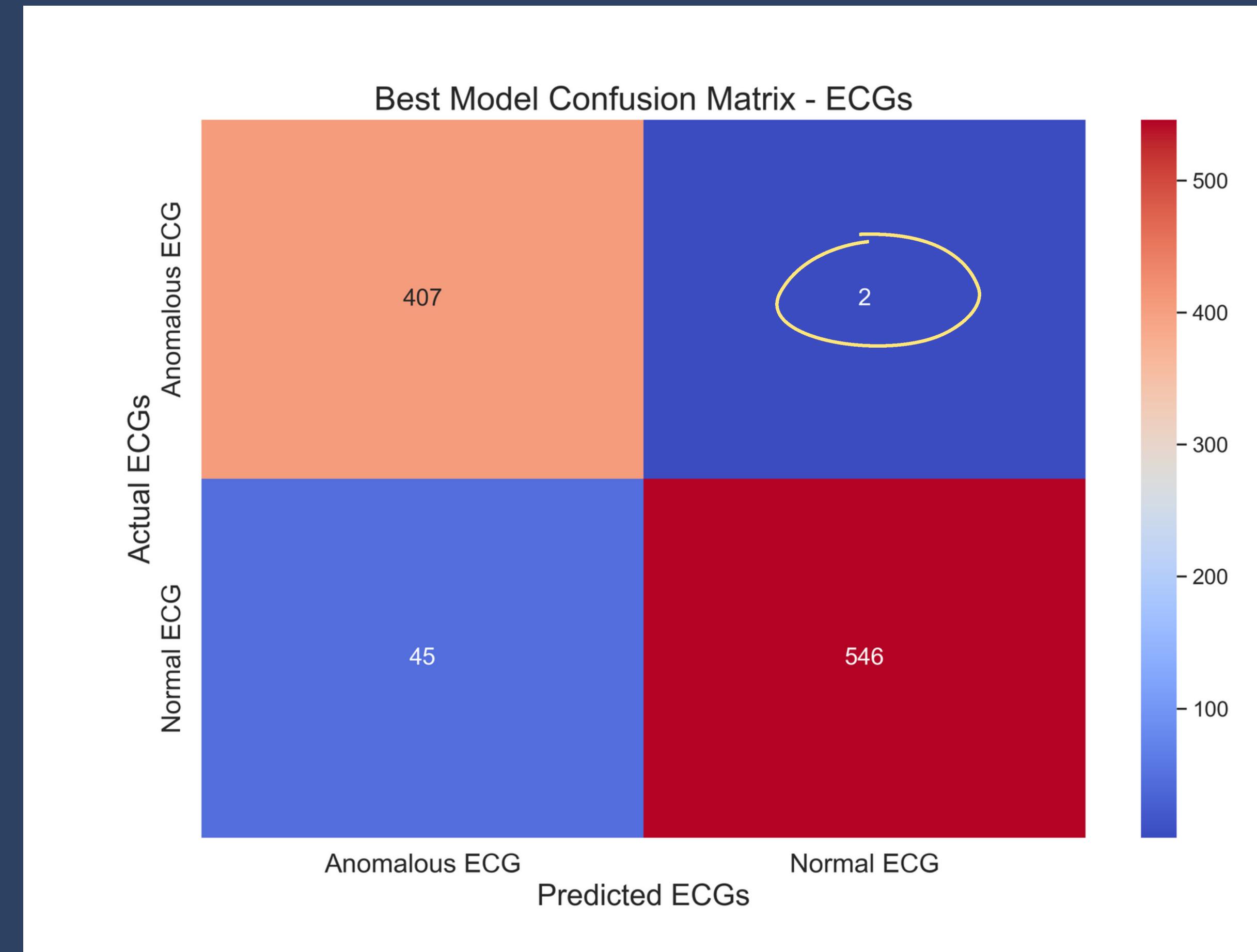
# Our Best Model Results



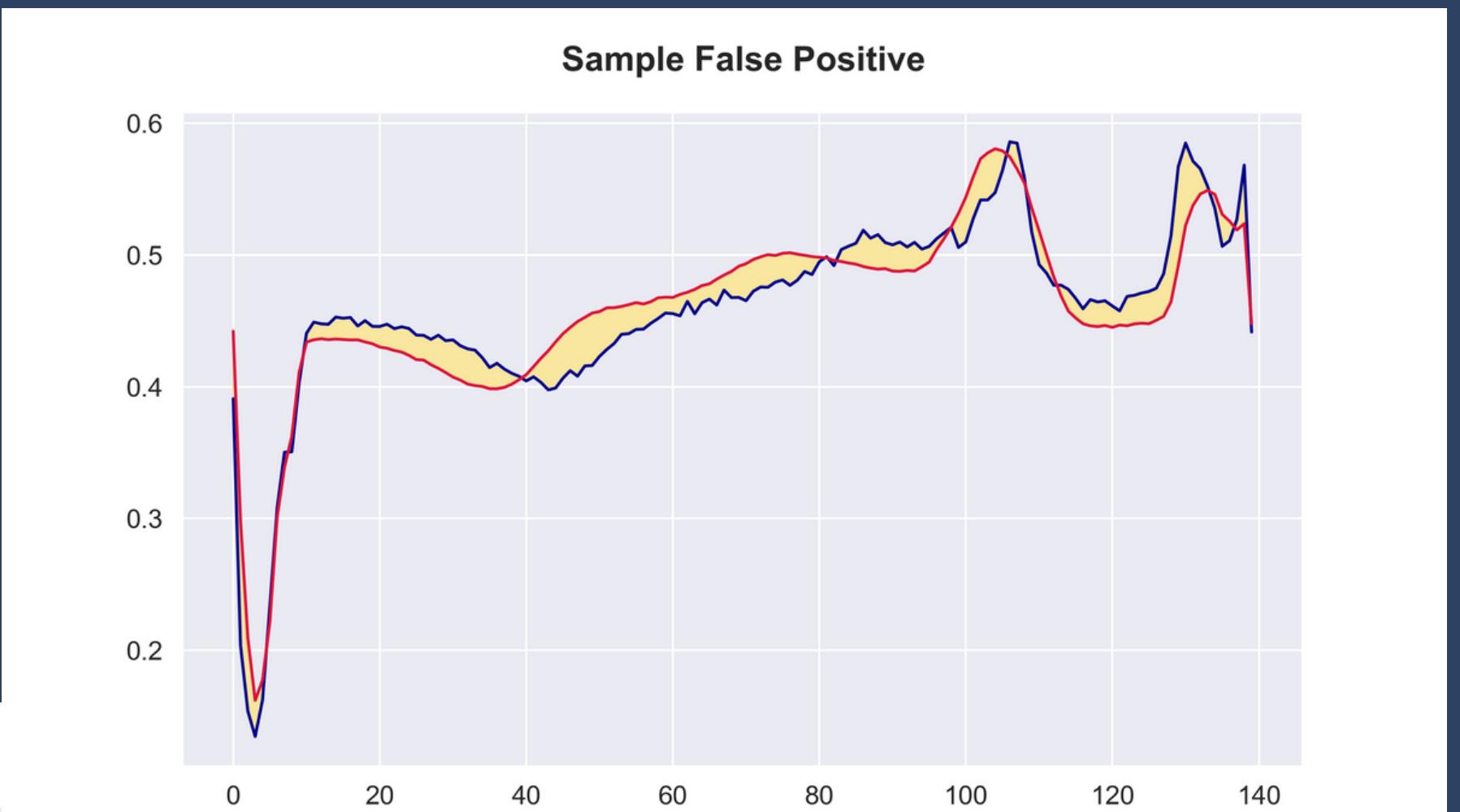
# Our Best Model Results



# Our Best Model Results



# A look at what we got wrong





# Conclusions

- Successfully identified the vast majority of anomalous heartbeats
- The modeling tool produced accurate and fast results

# Next Steps



# Next Steps

VERIFY



# Next Steps

VERIFY

CLARIFY



# Next Steps

VERIFY

CLARIFY

DEVELOP



# Next Steps

VERIFY

CLARIFY

DEVELOP

TRAIN



# THANK YOU!

Questions or Comments?

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