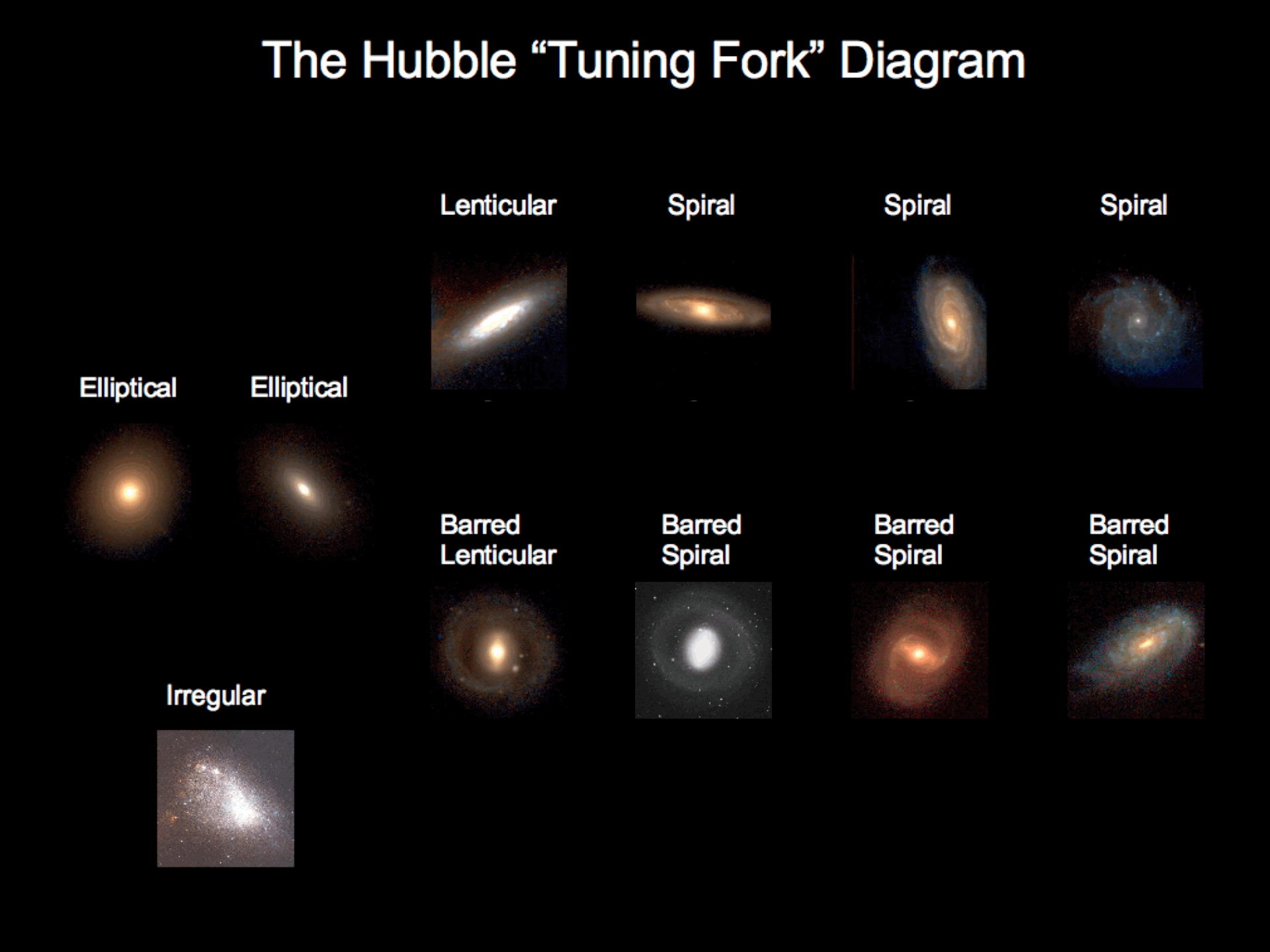
Classifying Galaxies in the Sloan Digital Sky Survey

Lori Beerman

The Hubble "Tuning Fork" Diagram

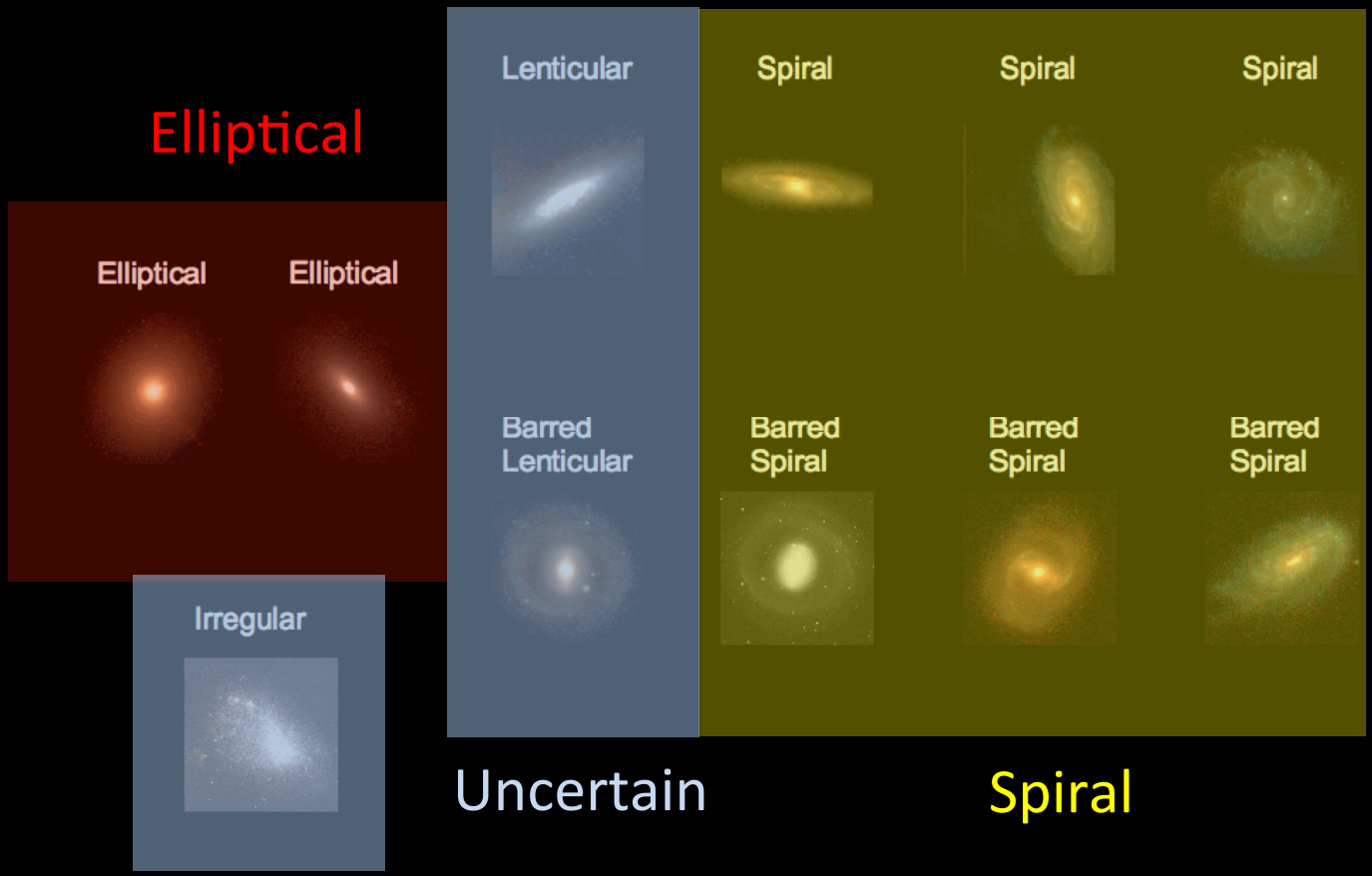


Data

Classifications

Data

Classifications




SQL


SLOAN DIGITAL SKY SURVEY III
SkyServer DR12

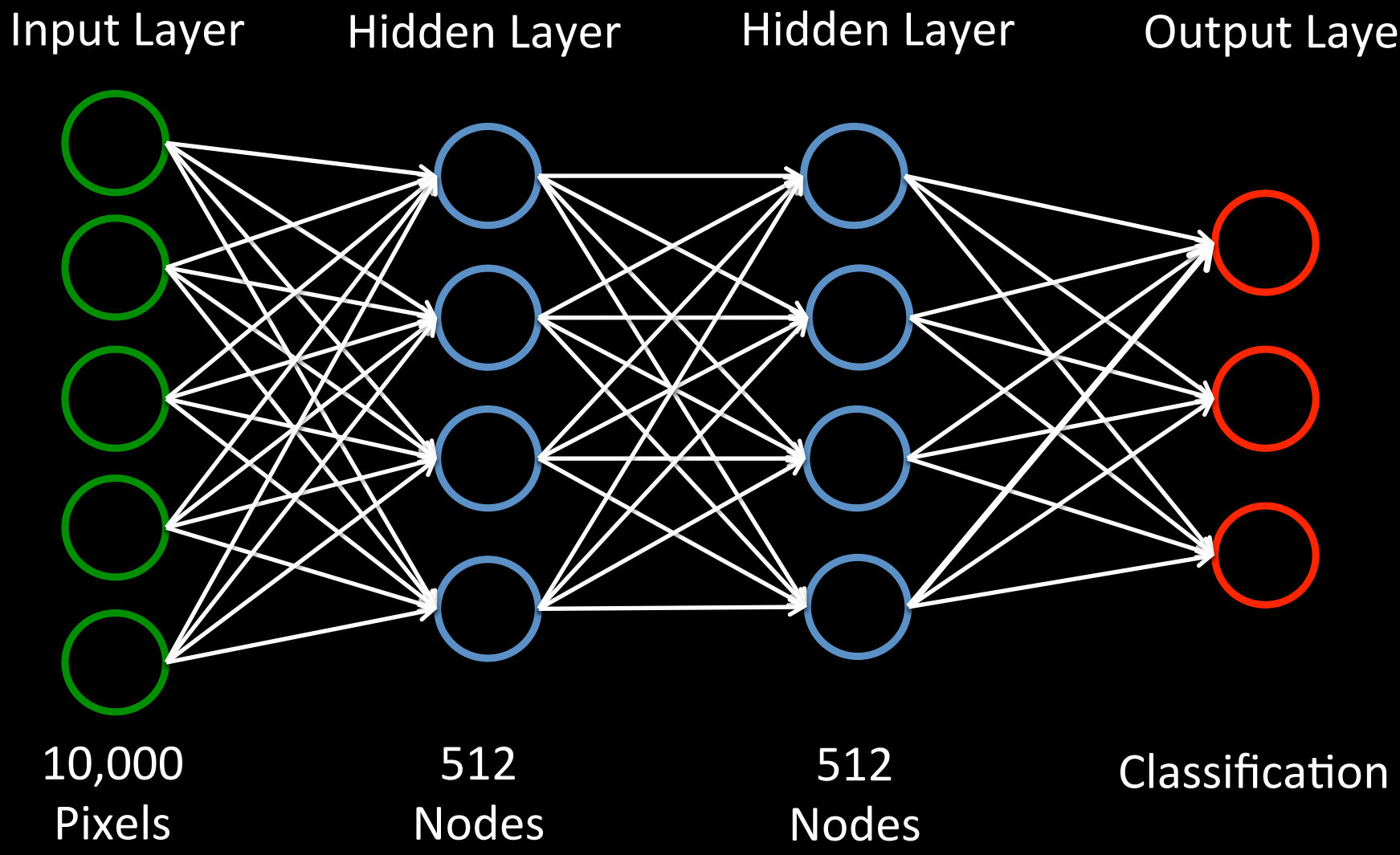

SciPy


NumPy


amazon
web services™

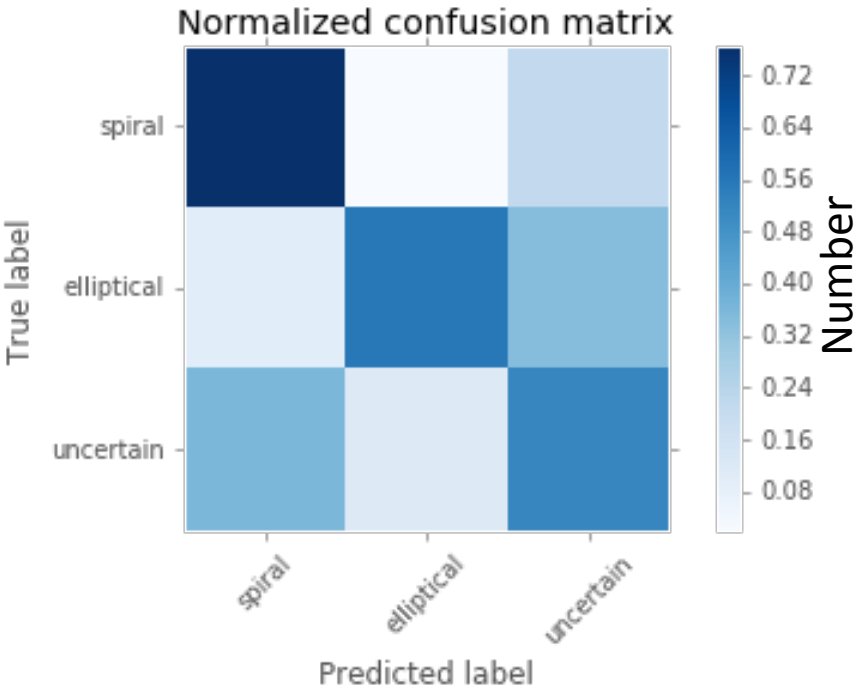

theano

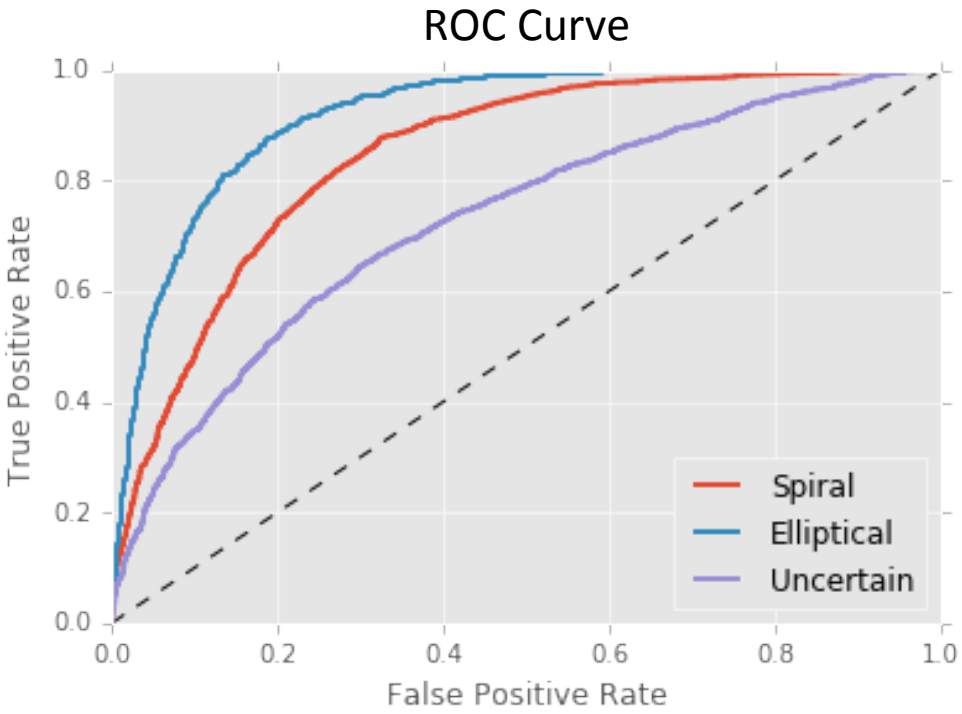
Neural Network Model



How well does the model work?

Overall accuracy is 66%, compared to random guess accuracy of 33%



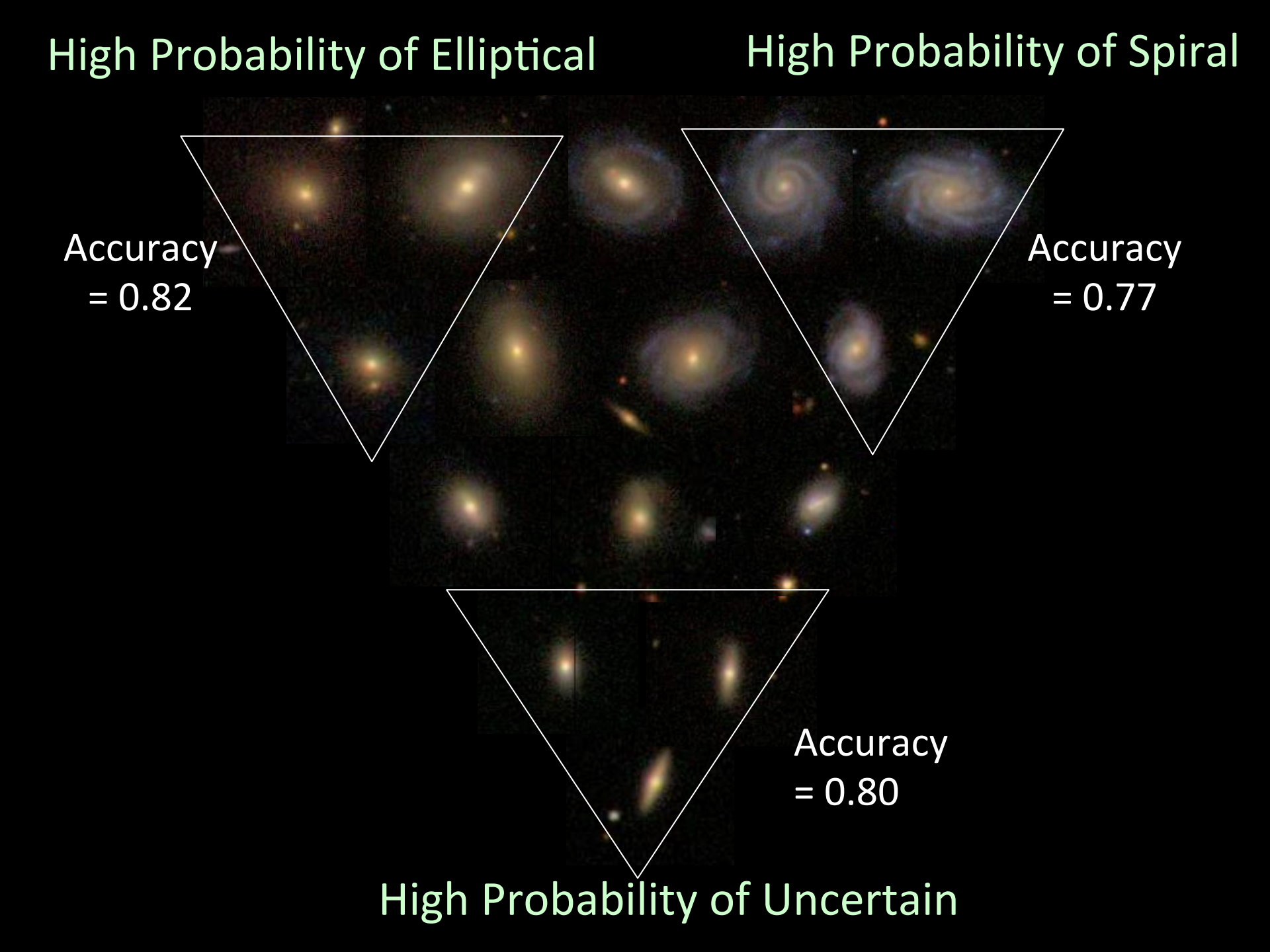


AUC for Elliptical = 0.92
AUC for Spiral = 0.85
AUC for Uncertain = 0.73

High Probability of Elliptical

High Probability of Spiral

High Probability of Uncertain


High Probability of Elliptical
High Probability of Spiral
Accuracy
= 0.82
Accuracy
= 0.77
Accuracy
= 0.80
High Probability of Uncertain

Conclusions and Next Steps

- ★Neural network model can accurately predict galaxy classification
- ★Reduce number of galaxies need to classify by eye
- ★Next, classify fainter galaxies and include more details such as barred spirals, etc.
- ★Try convolutional neural network

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github.com/loribeerman/galaxy_classification