

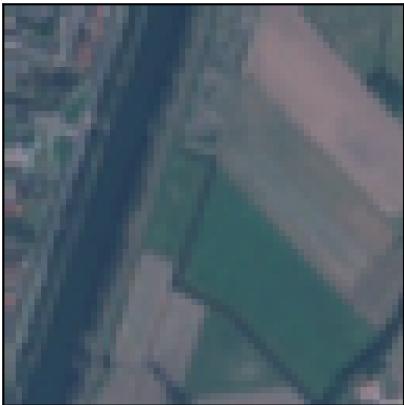


Satellite Image Classification with Computer Vision and Machine Learning

Peter Ilhardt

Objective: Correctly Predict the Land Cover Category of a New Satellite Image

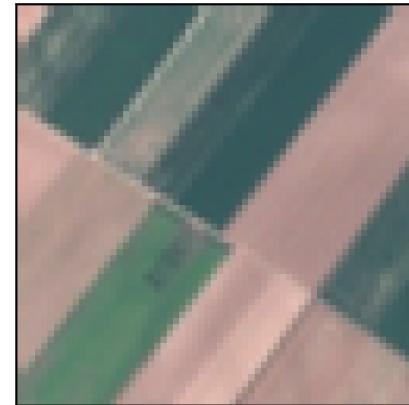
River



Industrial



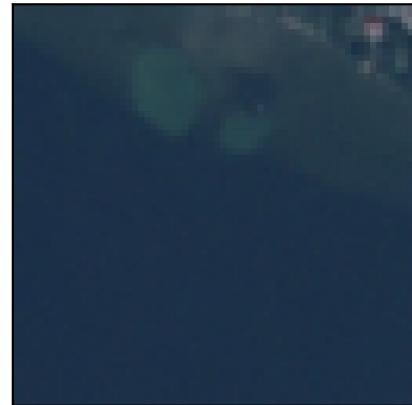
AnnualCrop



PermanentCrop



SeaLake



Highway



Residential



HerbaceousVegetation



Forest



Pasture

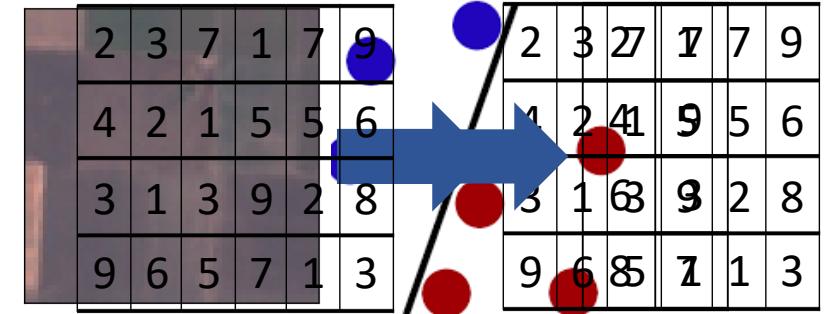


Modeling Pipeline

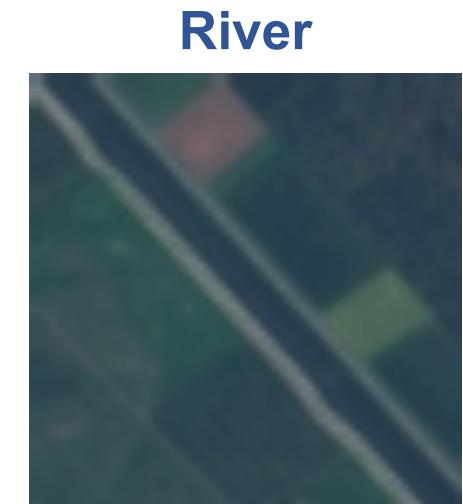
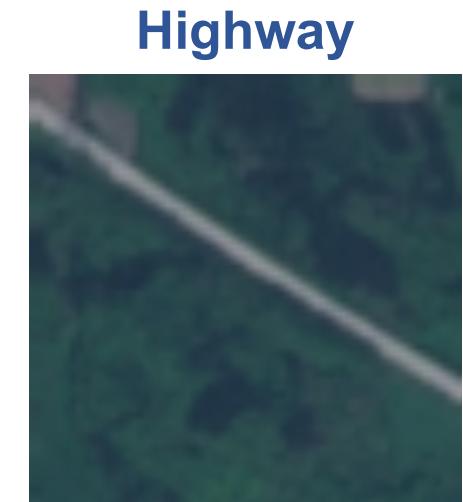
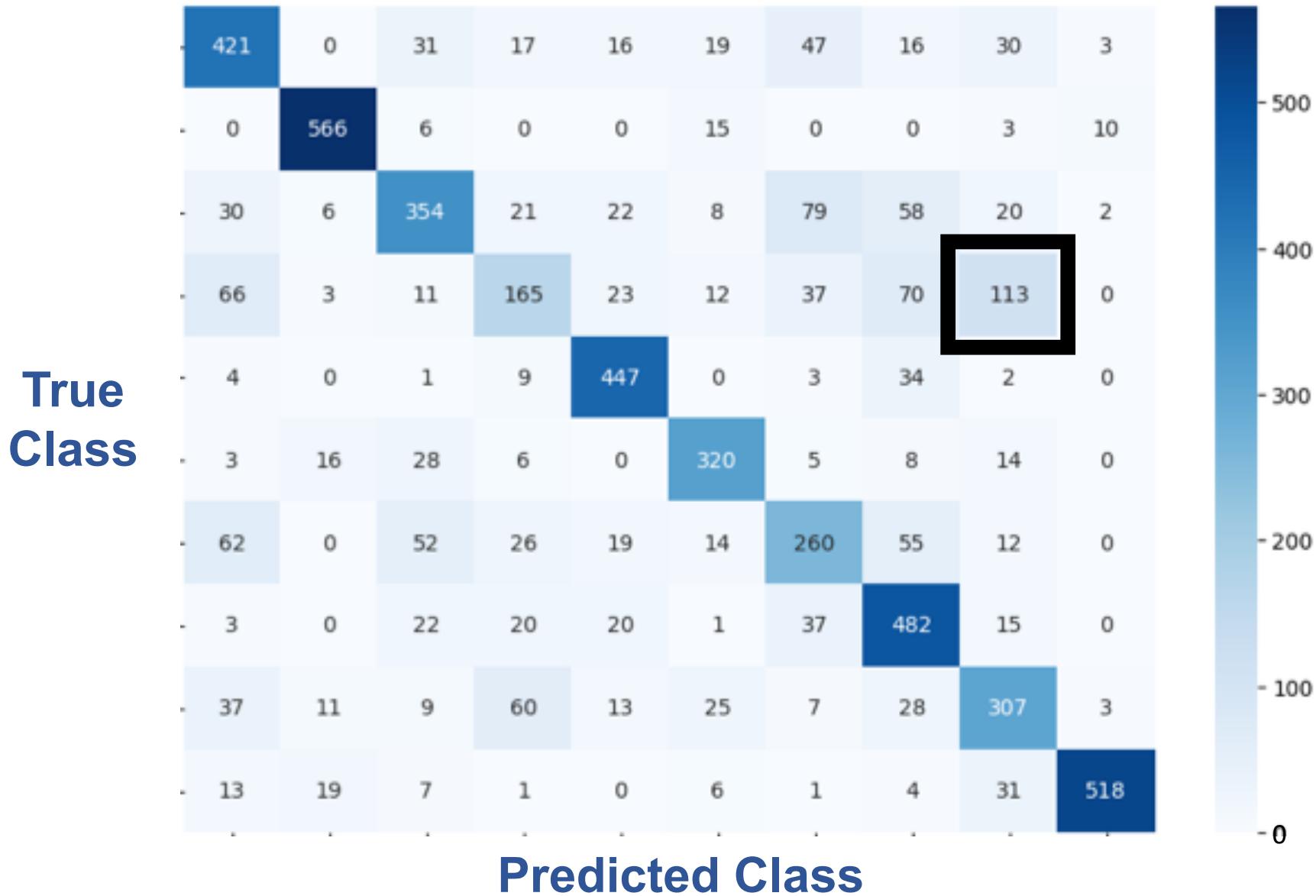
Image
Processing

Dimensionality
Reduction

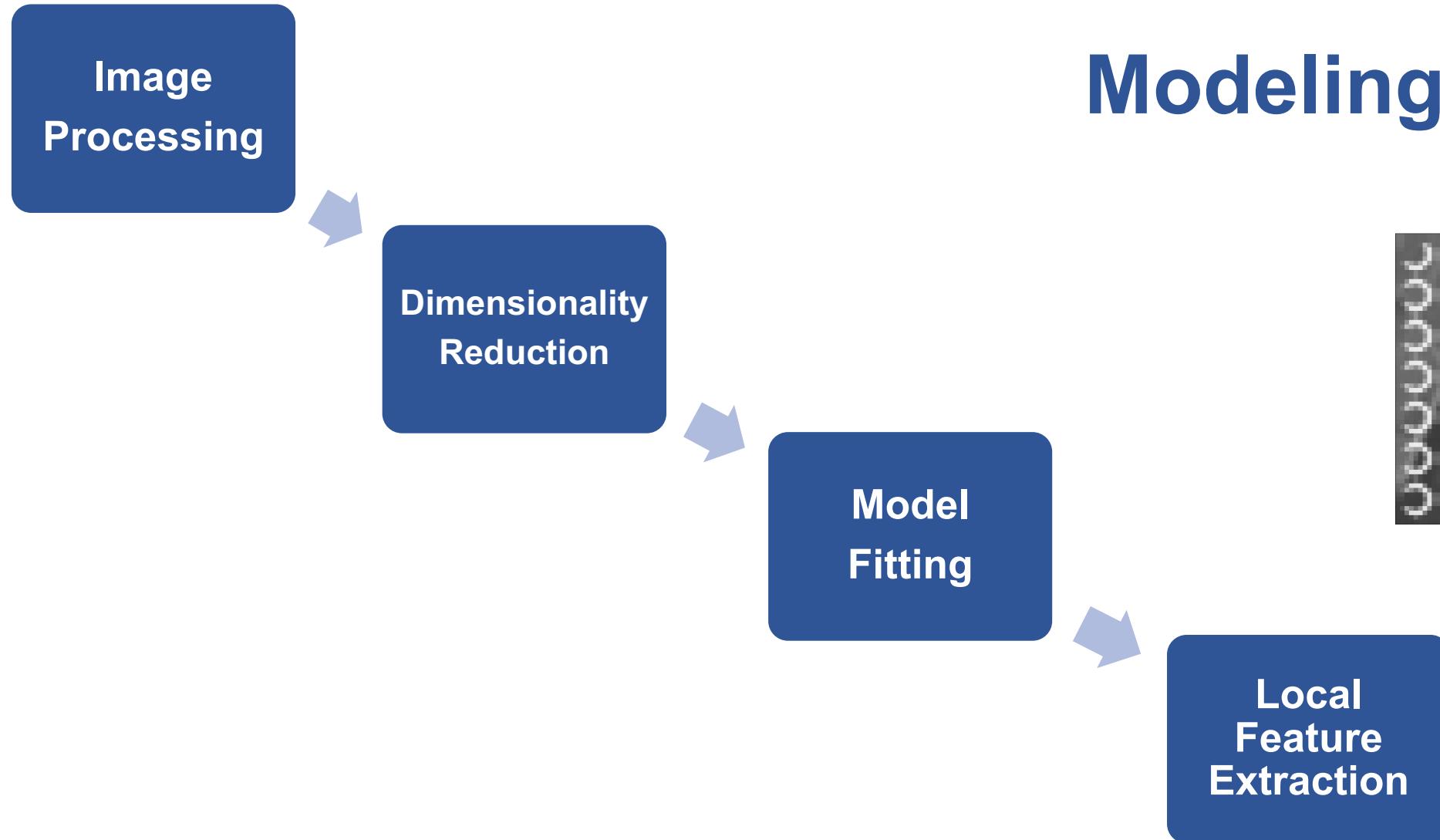
Model
Fitting



Best Model Confuses Line Objects



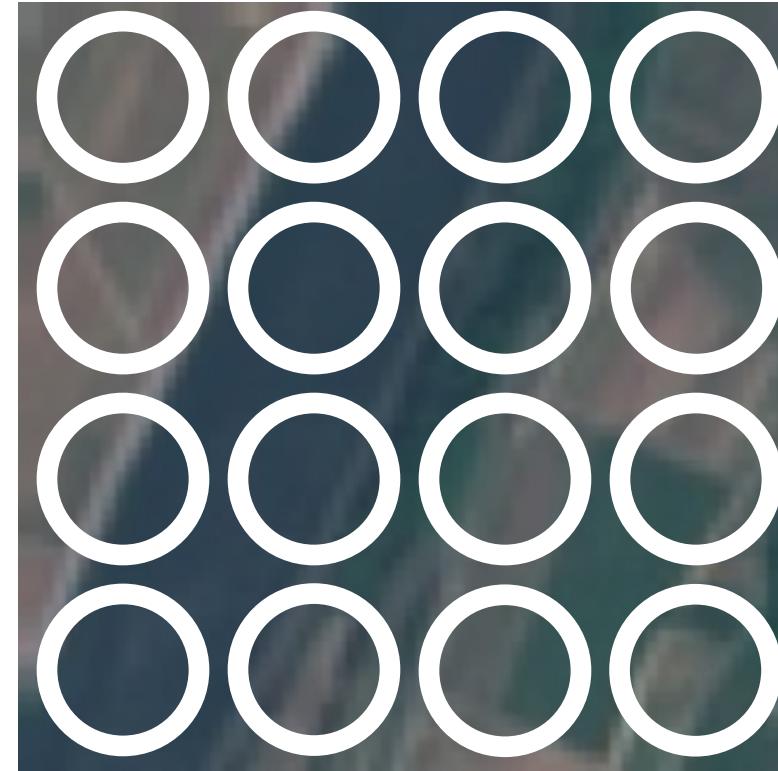
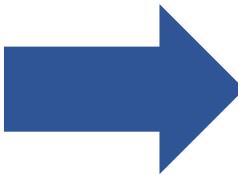
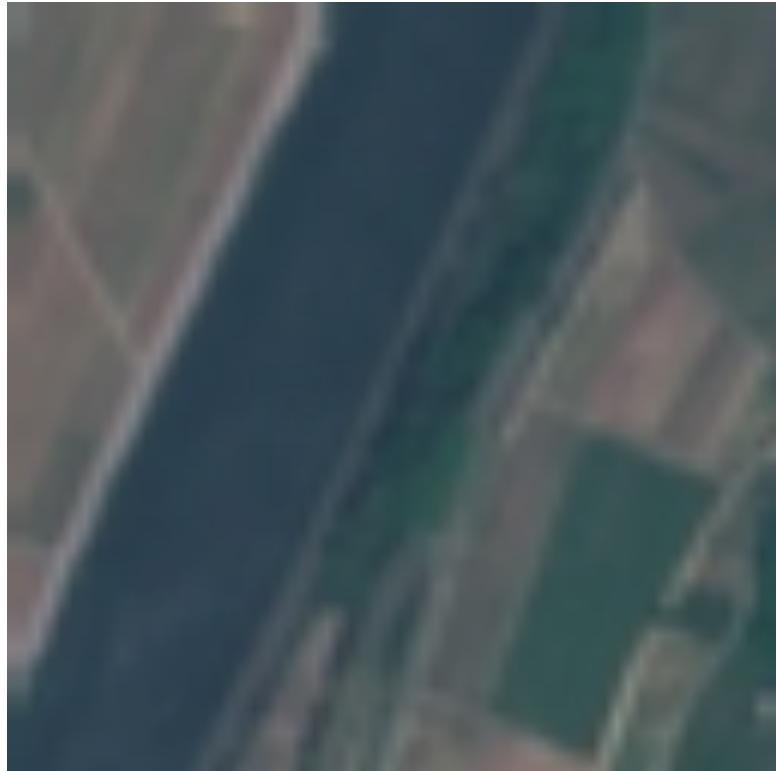
Modeling Pipeline



Scale-Invariant Feature Transform (SIFT)

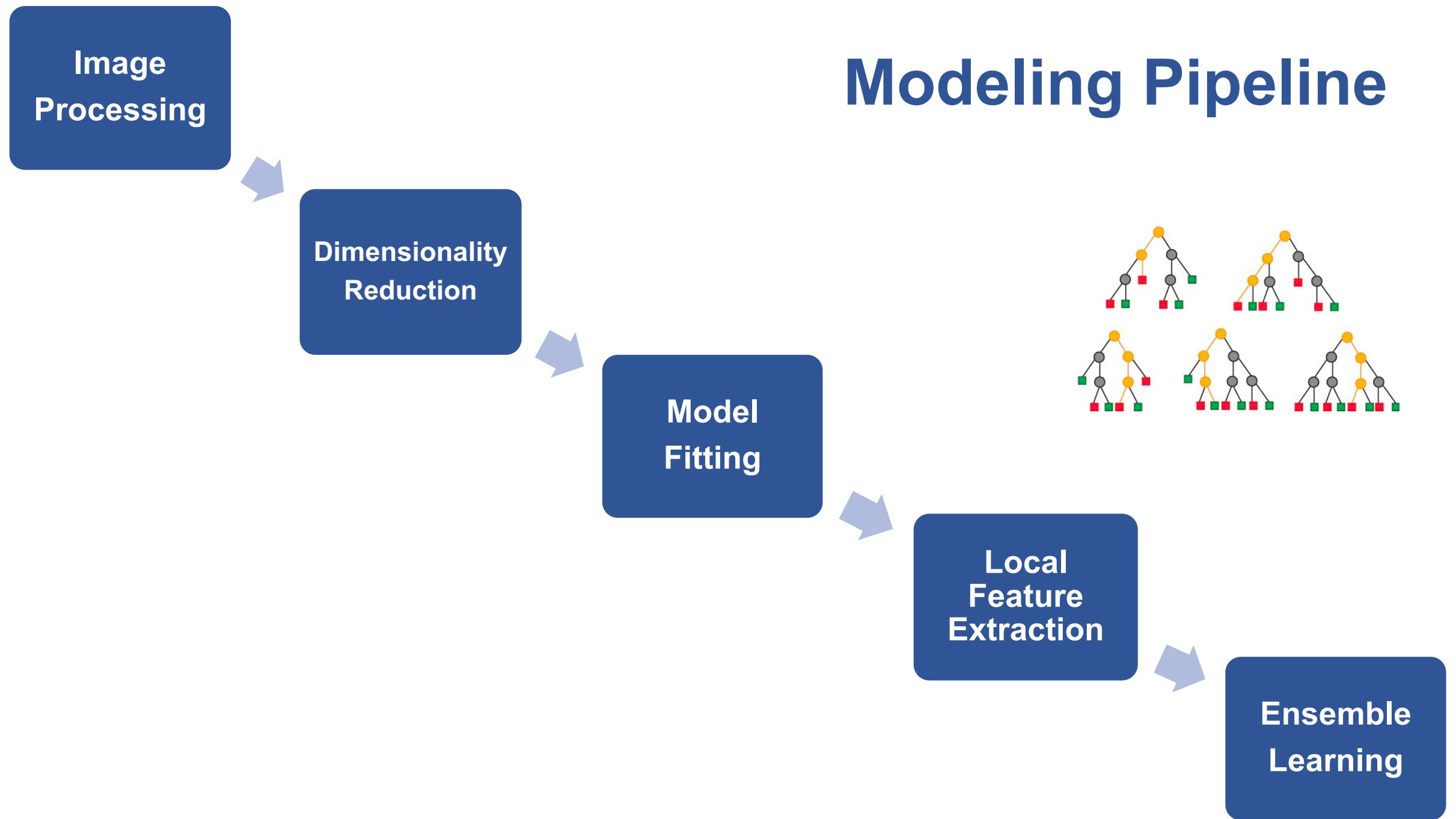


Local Feature Descriptors Improve Classification

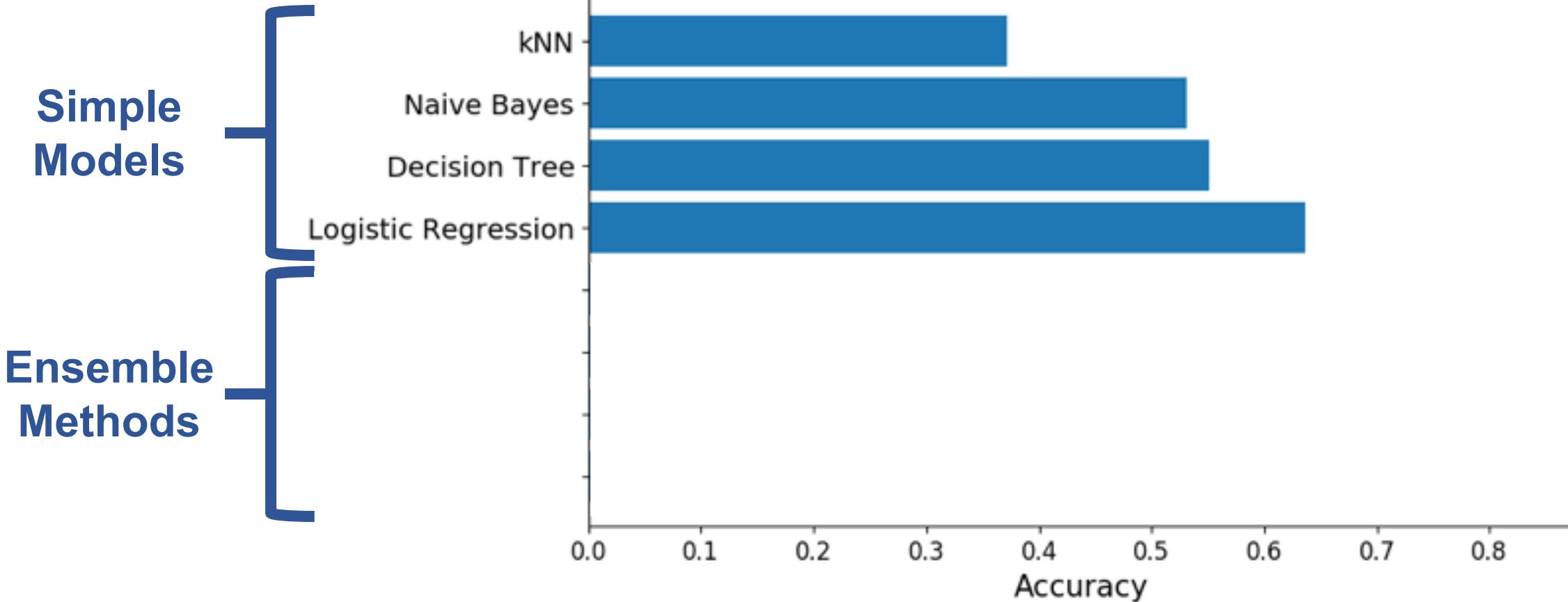


Accuracy = 81%

Modeling Pipeline



Ensemble Methods Leverage Strengths of Weak Learners to Generate Strong Learner



Conclusions

- Feature extraction and dimensionality reduction improve modelling with high-dimensional data (e.g. images, text)
- Accounting for feature interrelatedness (e.g. spatial, temporal) significantly boosts accuracy
- Many models are better than one





Thank You

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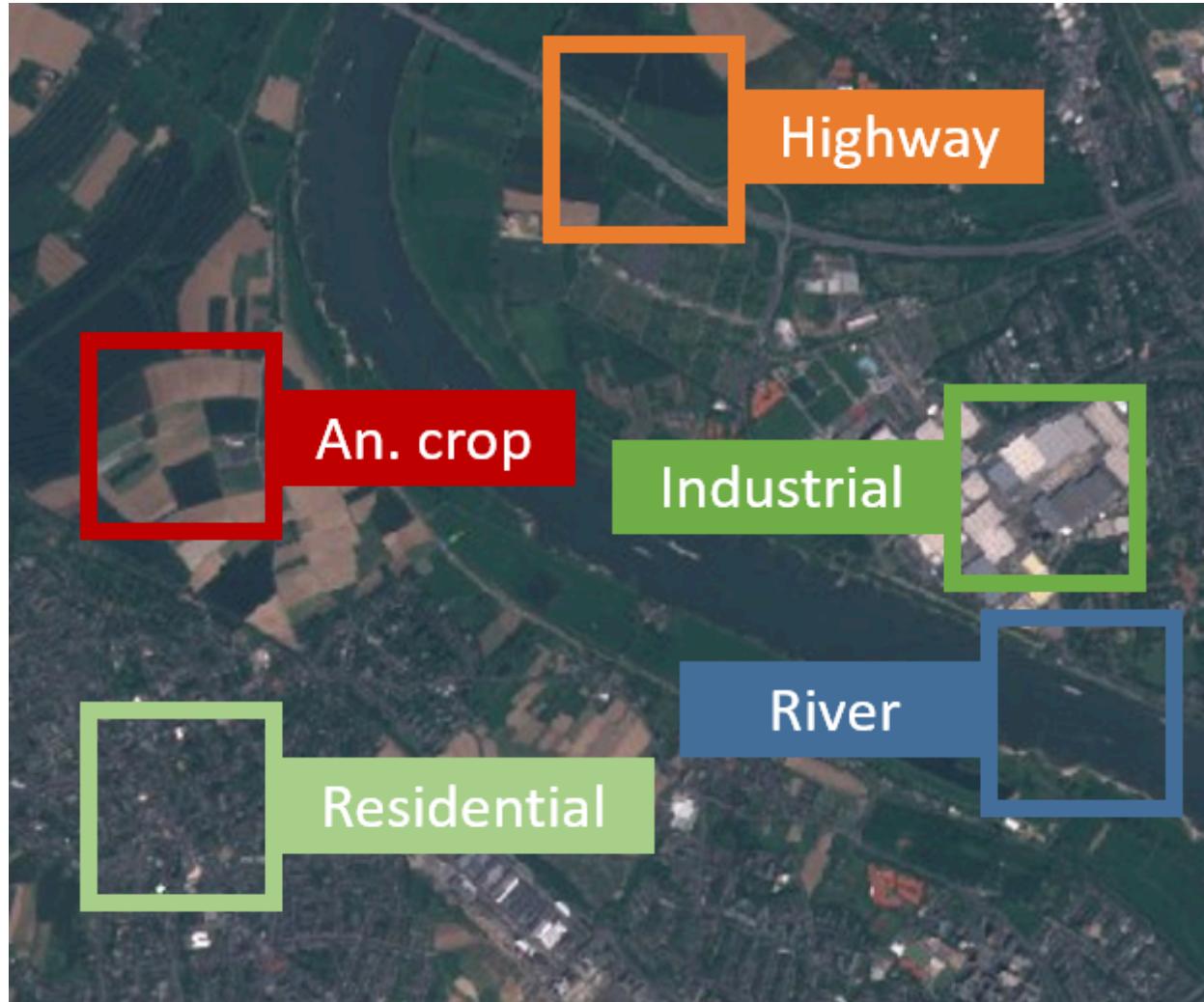
[/in/peterilhardt/](https://www.linkedin.com/in/peterilhardt/)



[/peterilhardt](https://github.com/peterilhardt)

Appendix

Satellite Imagery: Detecting Land Use Change Over Time



Principal Components Analysis Reduces Dimensions while Preserving Differences

