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Quantifying Rupture Risk of Brain Aneurysms

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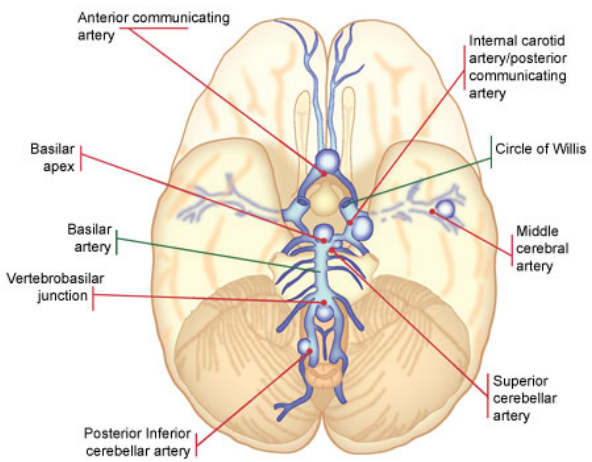
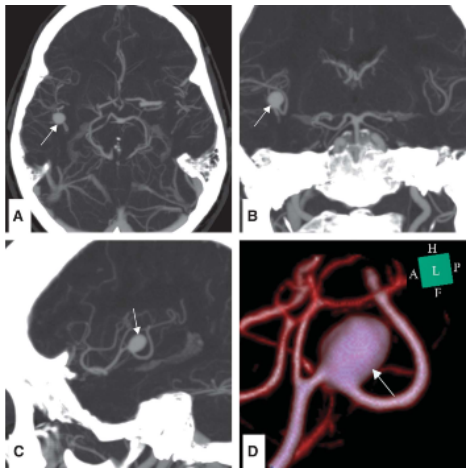
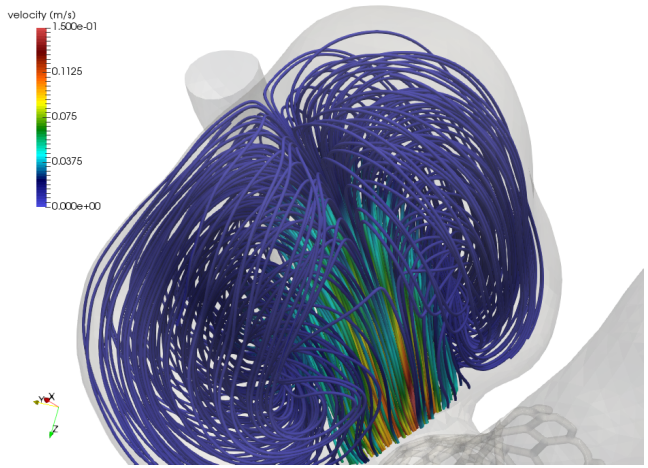
Quantifying Rupture Risk of Brain Aneurysms

Objective: Predict rupture risk of brain aneurysms using morphological descriptors and simulated blood flow data.







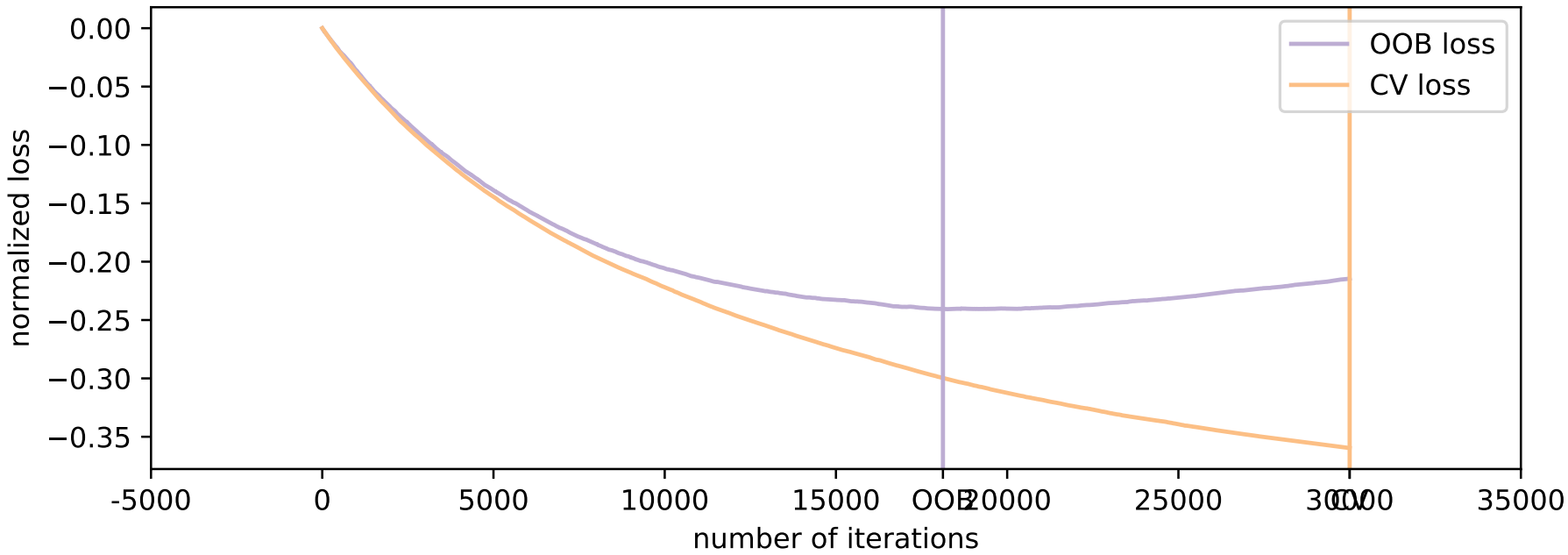
Challenges:

- Extract meaningful features from large-scale data set ($> 10\,TB$).
- Small number of observations (25 subjects).
- High-dimensional data-set (95 features).

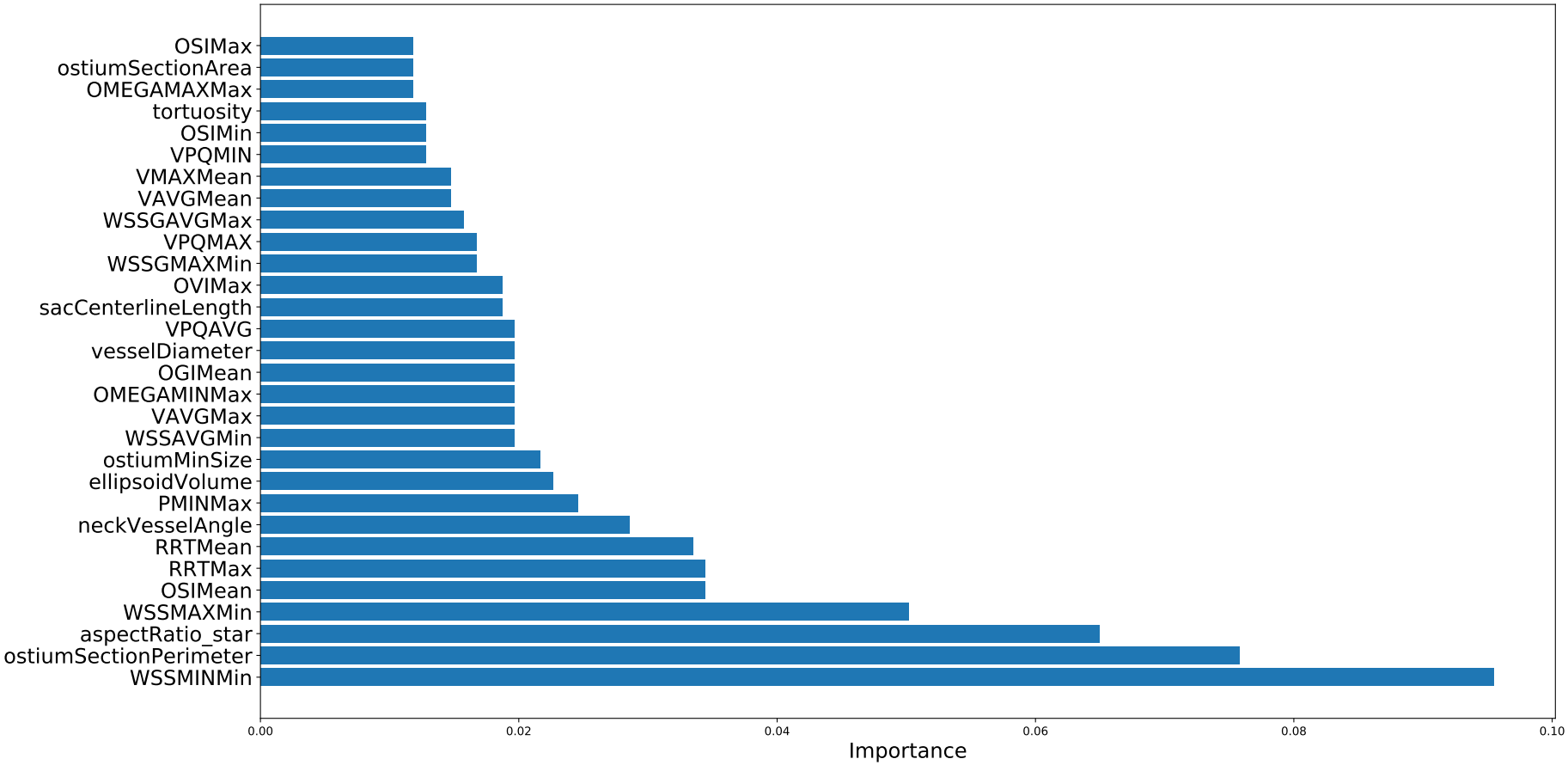
Outcomes (Fast Track / ”Hacking”)

- feature selection
- build parsimonious model
- predict rupture risk score for stented arteries (blind test)
- extract discriminating features

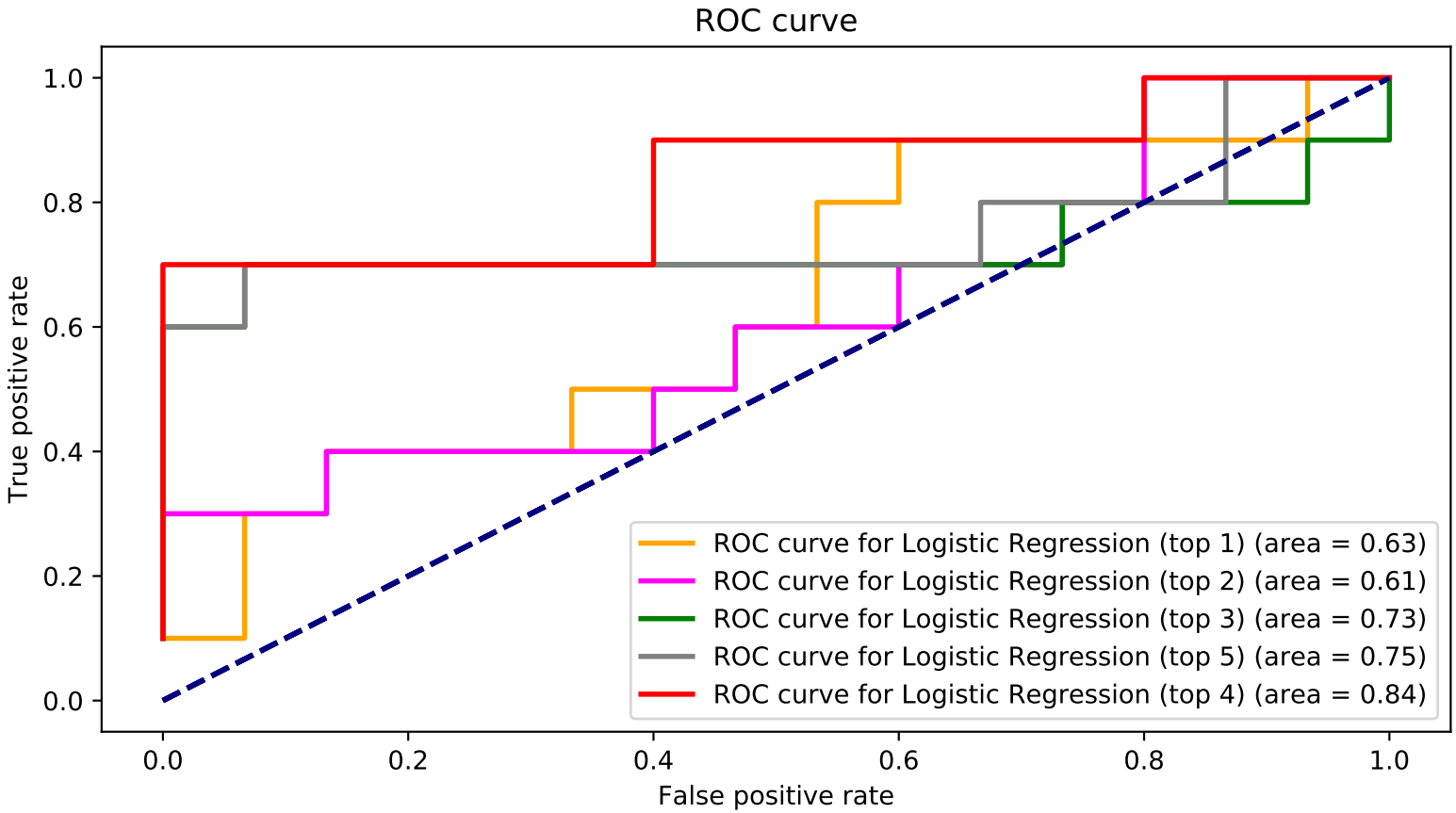
Feature Selection using Gradient Boosting Machine



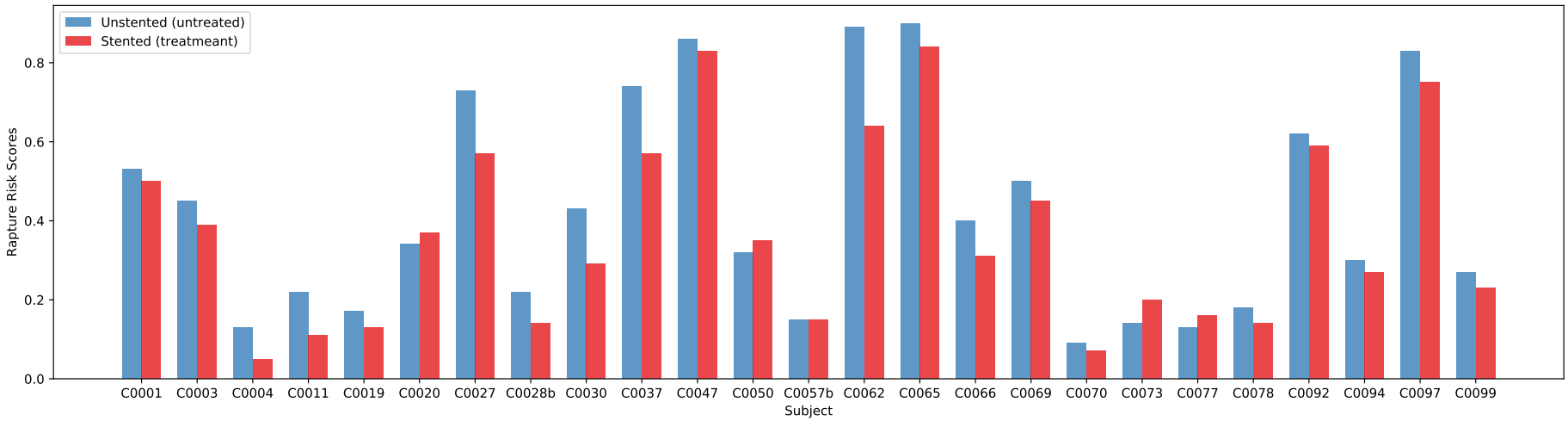
Identification of significant descriptors



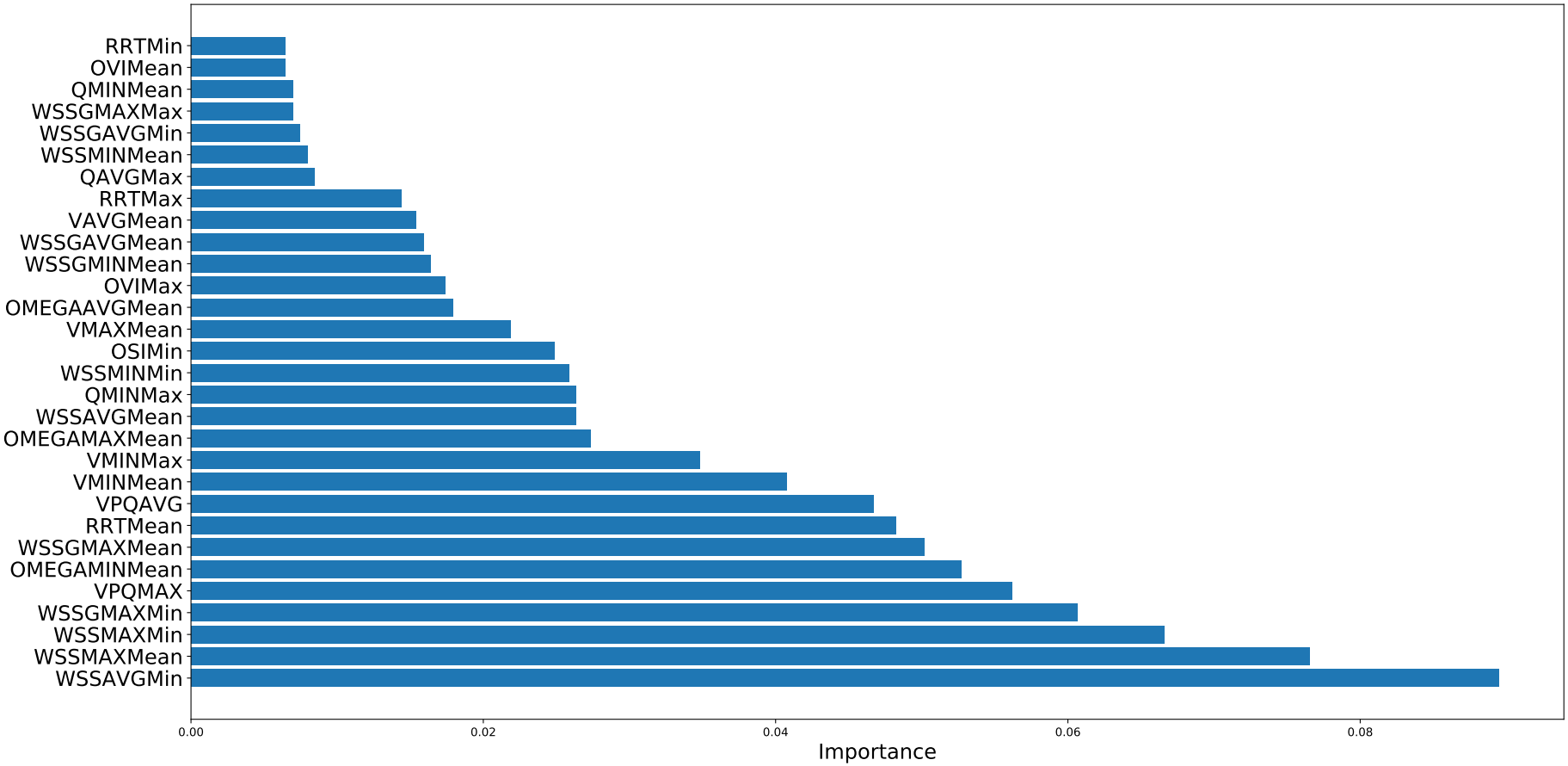
Choosing a parsimonious model



Risk scores for stented aneurysms



Discriminating features unstented vs stented flow



What's next (Deep Track / EAGER)

- How does a small change in the features affect the rupture risk?
- Compare "classical" feature selection methods.
- Use robust regression techniques.
- Apply dimensionality reduction to the full velocity data set.
- Systematic validation/generalization of models.

Thank you for your attention!