Uncertainty versus Decisions

Some (false) dichotomies between Astrophysics and Machine Learning

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Astrophysics

Uncertainty

Constraining Parameters

vs.

Machine Learning

Decisions

Making Predictions

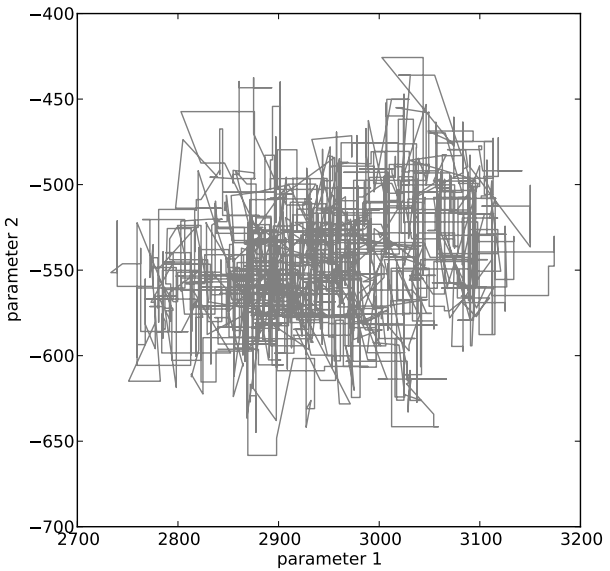
Astrophysics

Uncertainty

Constraining Parameters

Example: MCMC

exploring parameter space



vs.

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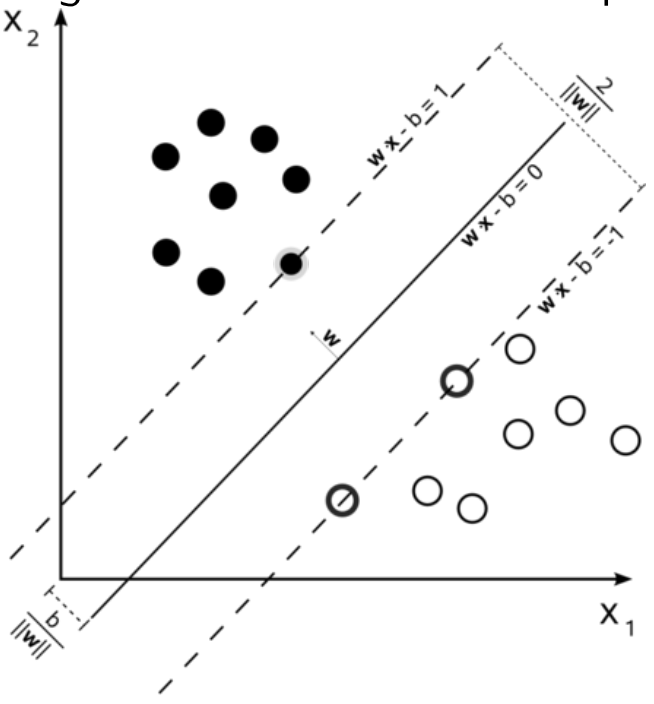
Example: SVM

finding boundaries in feature space



Credit: Wikimedia Commons

http://en.wikipedia.org/wiki/File:Svm_max_sep_hyperplane_with_margin.png

Astrophysics

Uncertainty

Constraining Parameters

Examples:

error bars
p-values
posterior distributions

vs.

Machine Learning

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Making Predictions

Examples:

F_β-scores
lift
ROC curves

Astrophysics

~~Uncertainty~~
Decisions

vs.

Machine Learning

Decisions

Counter Example

Planning observations and selecting targets

Examples:
telescope time
budgets for instruments
(HST oversubscribed by $\approx 600\%$)

Examples:
recommendation lists
marketing budgets