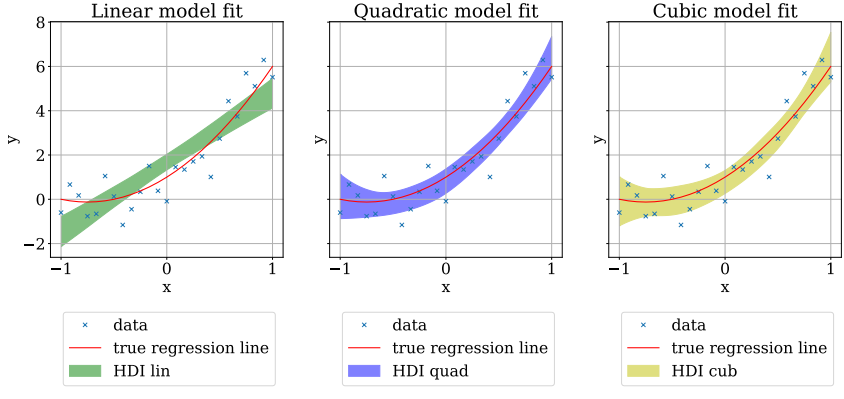
Bayesian model selection

Seminar physics760 – Computational Physics



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Introduction

Naturally, we are again all about that Bayes

Bayes' Theorem

$$\text{prob}(\boldsymbol{\theta}|y) = p(\boldsymbol{\theta}|y) = \frac{p(y|\boldsymbol{\theta}) \cdot p(\boldsymbol{\theta})}{p(y)}$$

with

- *posterior* $p(\boldsymbol{\theta}|y)$
- *likelihood* $p(y|\boldsymbol{\theta})$
- *prior* $p(\boldsymbol{\theta})$
- *marginal likelihood* $p(y) = \int_{-\infty}^{+\infty} \mathrm{d}\boldsymbol{\theta} p(y|\boldsymbol{\theta}) p(\boldsymbol{\theta})$

This can be used for *model selection* (?)

Table of Contents

Parameter estimation

JAN and MARIUS already talked about this, so here we only sketch the basics again

Model comparison

How do we turn Bayes' theorem into a tool for model comparison?

Sequential Monte-Carlo (SMC)

Savage-Dickey-Density-Ratio (SDDR)

Error analysis and diagnostics

Inhalt...

Choosing priors and likelihoods

Computing Bayes-factor

Summary

References I