Lecture 1: Introduction to Predictive Modeling

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The model calibration problem

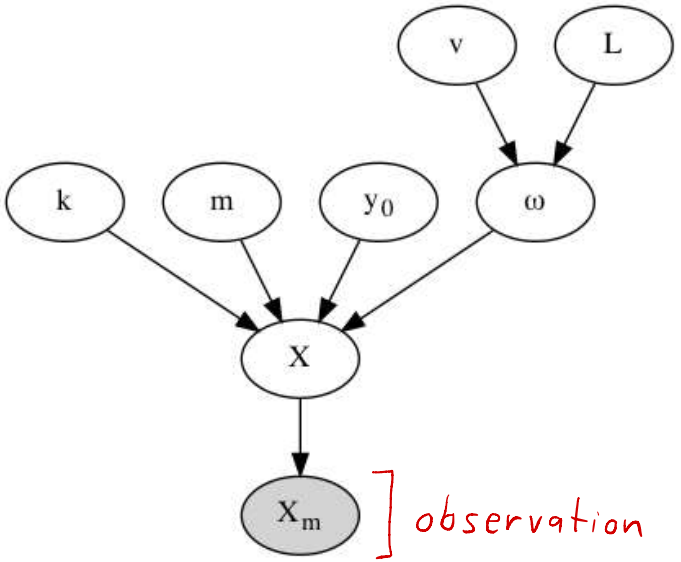
The model calibration problem

- The model calibration problem is the inverse of the uncertainty propagation problem.
- That is why such problems are also called **inverse problems**.
- We observe a quantity that is predicted by the model and we want to characterize how this observation changes our state of knowledge about the model parameters.
  - what are the parameters that give rise to this prediction?

Example: Driving a trailer on a bumpy road

- m: mass
- k: spring constant
- v: velocity
- y_0: amplitude of road roughness
- L: "wavelength" of road roughness
- X_m: the measurement

distinct from X



what is $y_0 | X_m$ or $L | X_m$?

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The formal solution to the model calibration problem

- Quantify our **prior** state of knowledge about all the model parameters.
- Use Bayes' rule to condition the prior knowledge on the observations to get the **posterior** state of knowledge.
- Create a practical procedure that characterizes our posterior state of knowledge.