Training datasets from field operations

Vertical control

Fault database

Identifying past critical failures

CRITICAL fault message - rough syntax:

"[CBIT] (CRITICAL): <text> in component: <component name>"

"[<component name>] (CRITICAL): <text>"

Components that relate to vertical control:

'MassServo','ElevatorServo','BouyancyServo','VerticalControl','ThrusterServo','DropWeight'.

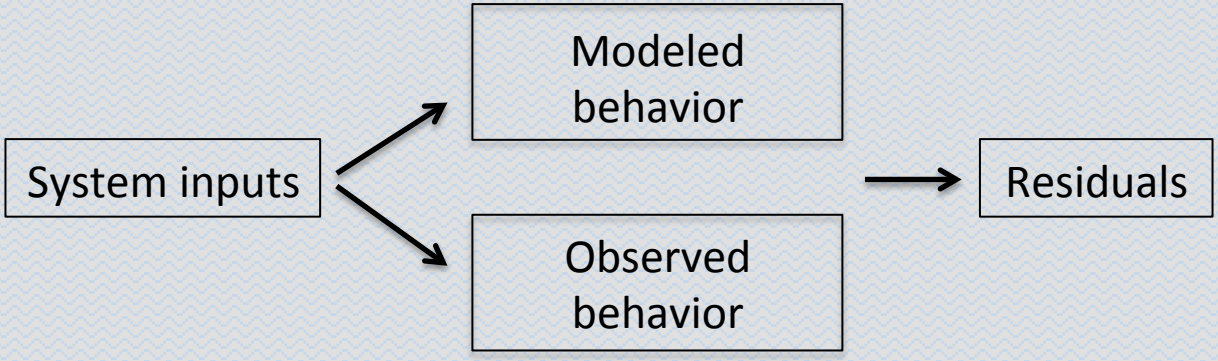
Others (indirect): 'Depth_Keller', 'DVL_micro'.

Extract using Linux command set – find | grep | egrp

Eliminate redundancy and sort chronologically | by component (MATLAB)

Predicting parameters

1) System identification - simulation residuals
- Buoyancy
- Pitch



2) Statistical properties of signal
- Cross-correlation/decorrelation
- Variance

3) Target specific behavior
- Algorithm

Binary classification

Logistic regression and predictive framework

*Kruschke [2010] and Gelman and Hill [2007]

Logistic regression model (written in terms of the *logit* function)	$\ln\left(\frac{p(y=1)}{p(y=0)}\right) = \beta_0 + \beta_1 x_1 \ldots$
Logistic regression model (written in terms of the *logistic* function)	$p(y=1) = \frac{e^{\beta_0+\beta_1 x}}{1+e^{\beta_0+\beta_1 x}}$

The logistic sigmoid function of a single variable with the measurement variable on the horizontal axis and the probability for the outcome of the dependent variable (between 0 to 1) on the vertical axis.

Figures: Kruschke [2010]

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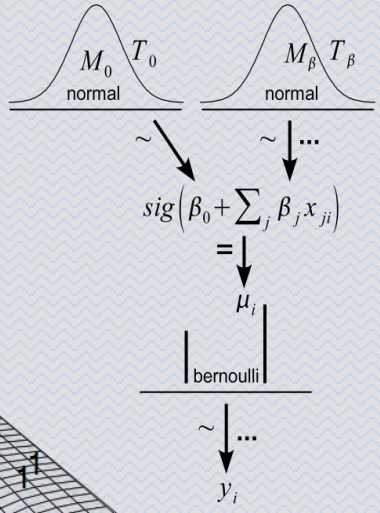

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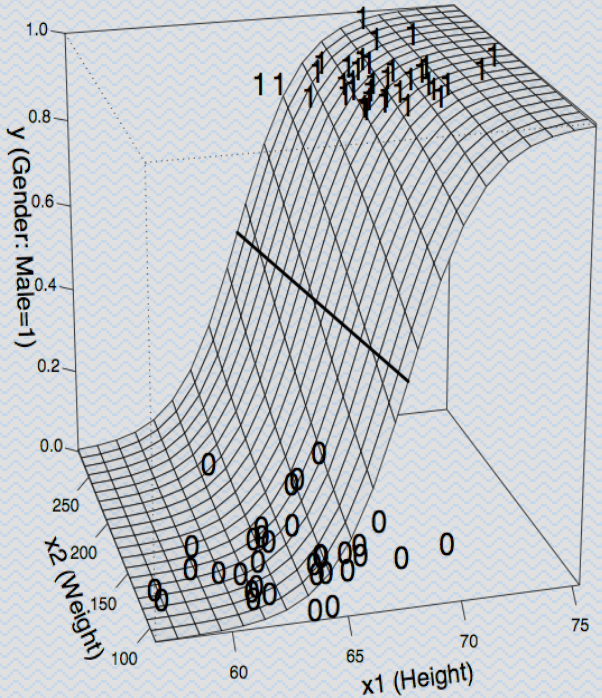

Bayesian Inference

$$P(\text{parameters}|\text{data}) = \frac{P(\text{data}|\text{parameters}) \times P(\text{parameters})}{P(\text{data})} \propto \text{likelihood} \times \text{prior}$$

Figures: Kruschke [2010]