

Updating your knowledge about fault types using Bayesian theory

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Why and How

Why?

Different causes are only affecting certain fault types

We can use variables where only partial or subjective information exists

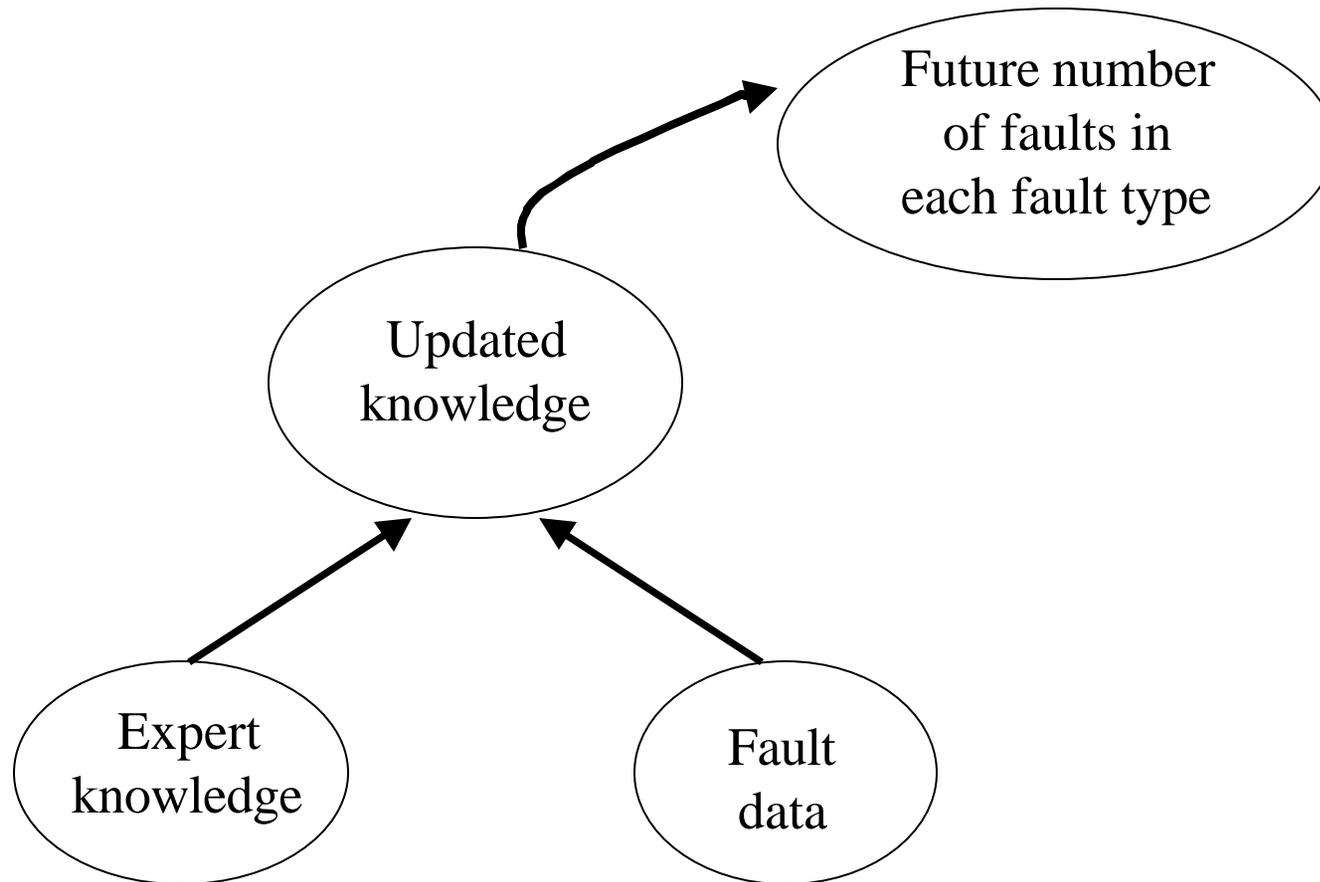
We can combine empirical data with expert judgement

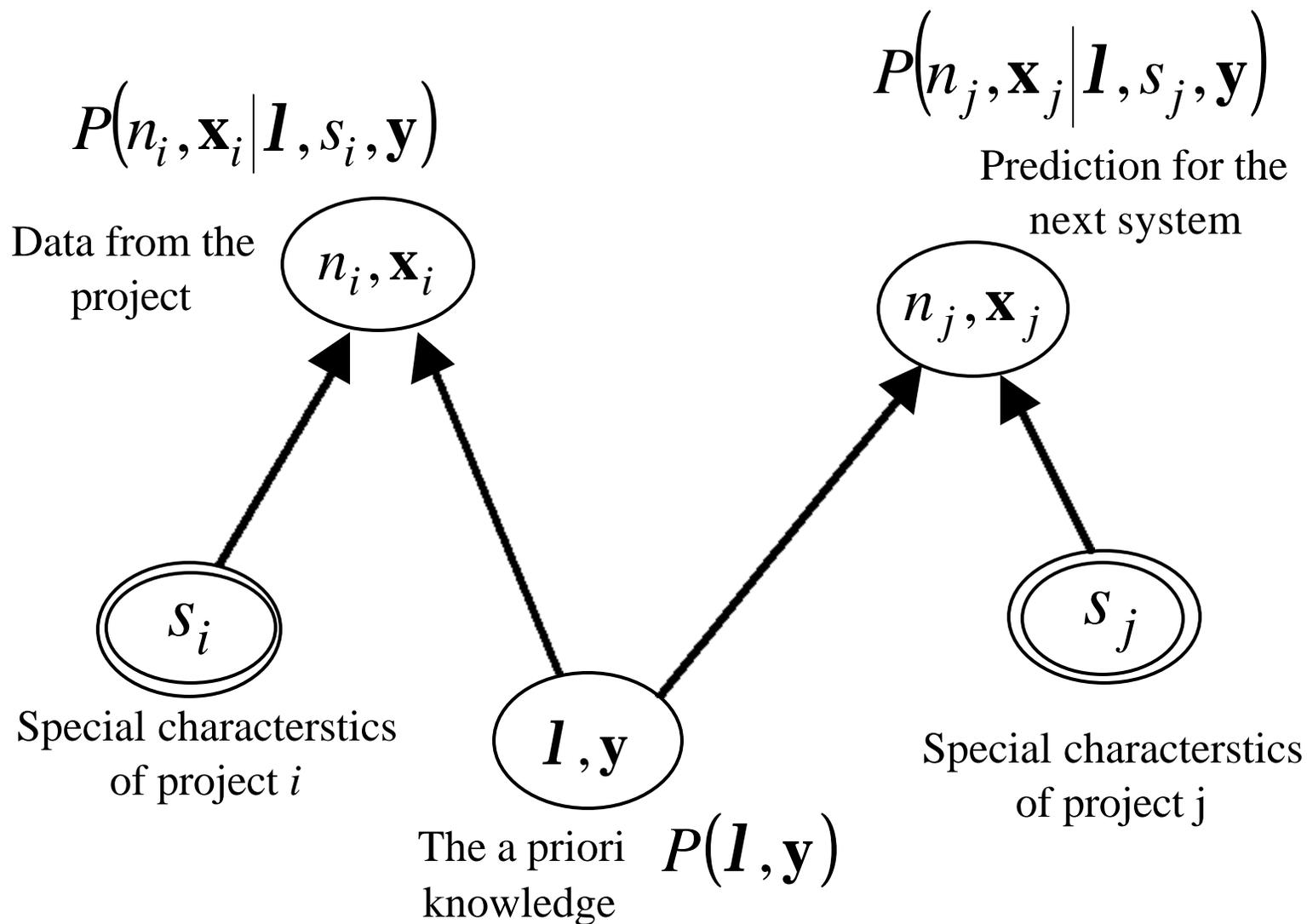
How?

Probability distributions

Bayesian analysis

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An application from Saab Aerospace

The expert group judged that:

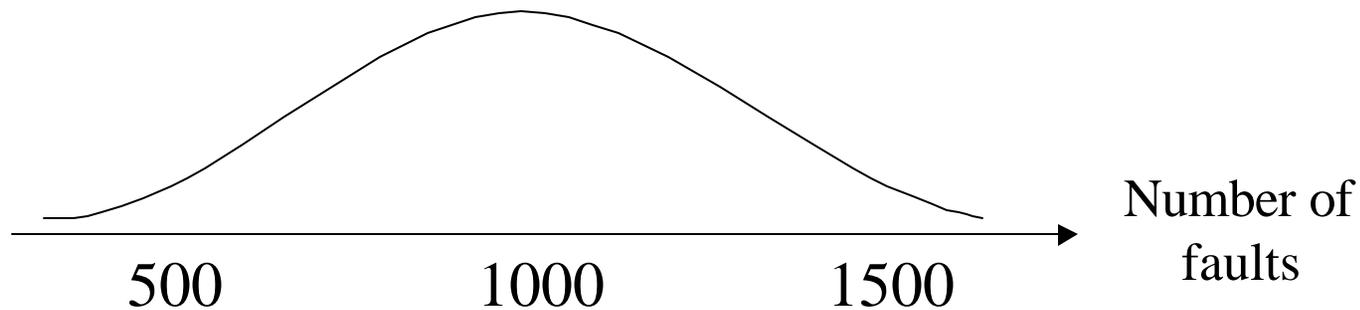
Around 1000 total number of faults - very unsure

Seven different fault types

Computation	5%
Data handling	20%
Data problem	5%
Document quality	20%
Documentation	20%
Interface/timing	10%
Logic	20%

Modelling the knowledge

How do we model this knowledge?



$$D1 = 75$$

$$D2 = 300$$

$$D3 = 75$$

$$D4 = 300$$

$$D5 = 300$$

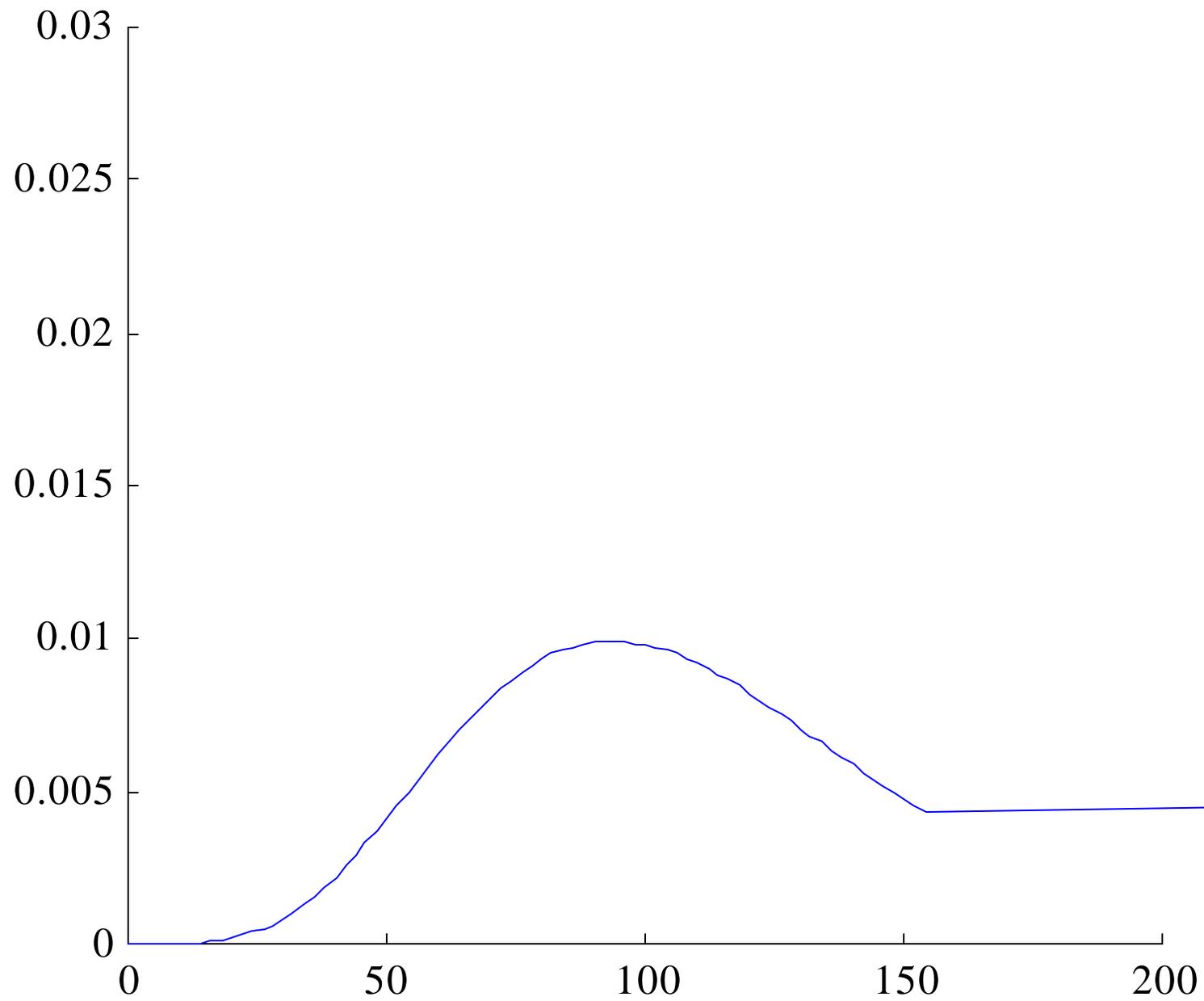
$$D6 = 150$$

$$D7 = 300$$

The empirical data

The software is a subsystem, Built In Test (BIT), of the Electrical Flight Control System (EFCS) in JAS 39 Gripen.

- Approximately 1100 faults to date.
- The code was programmed in ADA
- Divided into 204 modules



Prediction - fault types

Fault type	Experts' belief	Updated belief
Computation	5%	4%
Data handling	20%	23%
Data problem	5%	5%
Document quality	20%	17%
Documentation	20%	21%
Interface/timing	10%	15%
Logic	20%	15%
Total	100%	100%

Future directions

More empirical data are needed

Model the uncertainties in different variables

Combining fault, time and cost predictions