

# Systemes de raisonnement probabilistes

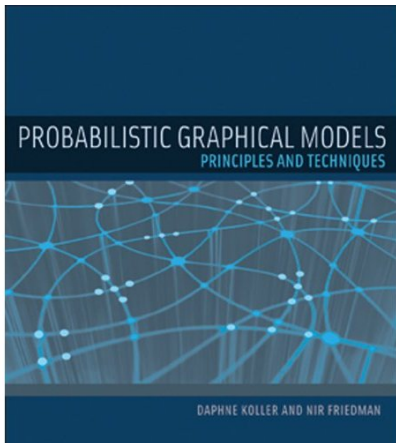
Philippe LERAY

philippe.leray@univ-nantes.fr

DUKe (Data User Knowledge) Research group  
Laboratoire des Sciences du Numérique de Nantes – UMR 6004  
Site de l'Ecole Polytechnique de l'université de Nantes



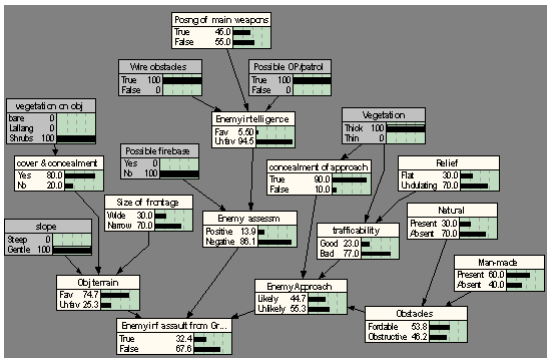
## Introduction



### Probabilistic Graphical Models

- Marriage between Graph theory and Probability theory
- Powerful framework for representing complex domains using probability distributions
- Numerous applications in machine learning, computer vision, natural language processing, computational biology, ...

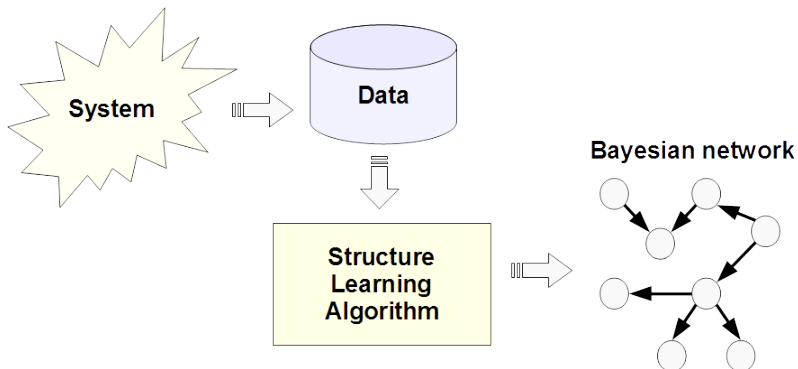
# Bayesian networks for knowledge modeling and reasoning



## Advantages

- Modeling uncertain relationships
- Reasoning from incomplete observations

## Bayesian networks for knowledge discovery

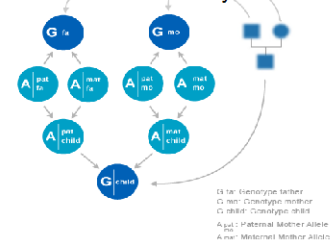


### Advantages

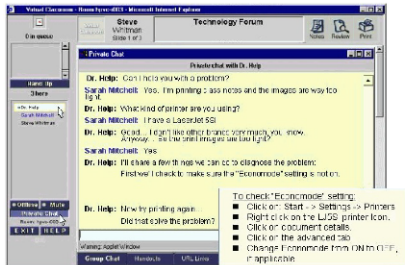
- Structure learning from data
- Graphical interpretation

# Bayesian networks applications

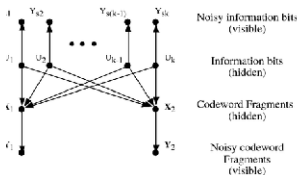
## Victim identification system



## After-sale services



## Turbo-codes (GSM, ...)



## MS Office assistant

It looks like you're writing a letter.

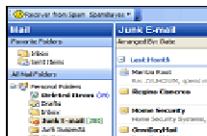
Would you like help?

- Get help with writing the letter
- Just type the letter without help

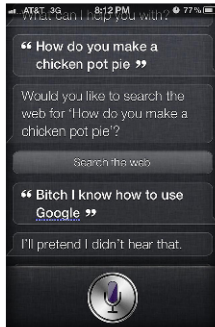
Don't show me this tip again



## Anti Spam



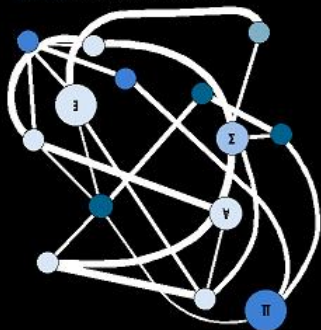
## Assistant iPhone SIRI



## Some other PGMs

INTRODUCTION TO  
STATISTICAL RELATIONAL LEARNING

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## Several extensions or specific models

- BN for classification
- extensions to continuous or mixed data : Continuous Linear Gaussian BNs
- extensions to temporal modelling : dynamic BNs
- extensions to relational data : Probabilistic relational models
- ...

## Syllabus

### Organization : 8 CM+ 4 TD

- definition
- inference
- learning
- some extensions ? (DBN, PRM)

### Personal work and evaluation

- one final exam
- reading and summarizing one applicative paper about BN

### One Python library to use on Google Colab

- <https://pyagrum.readthedocs.io/>

