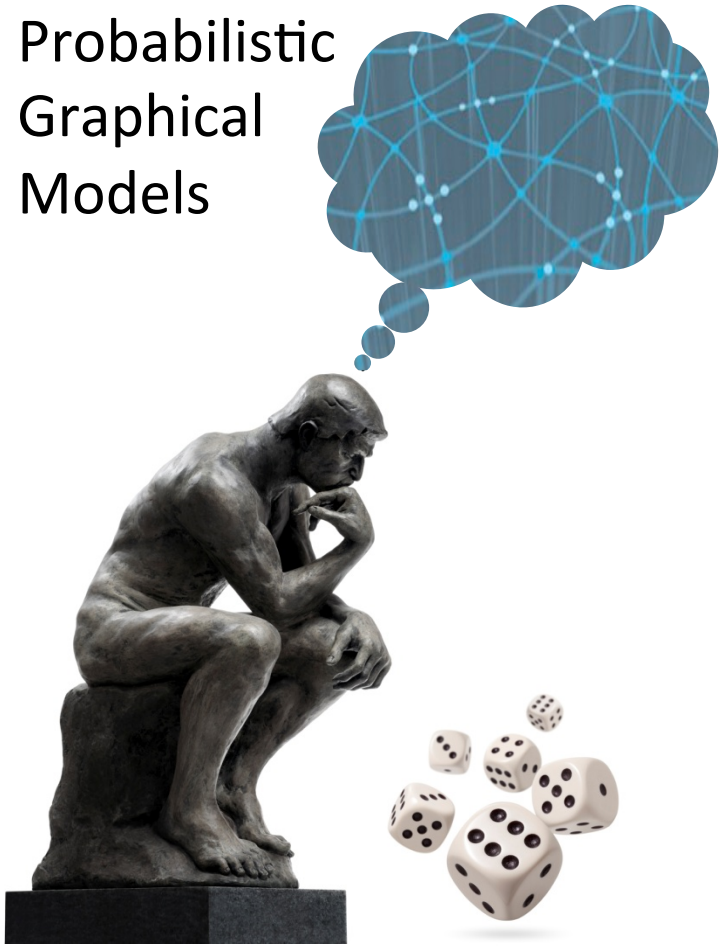
Probabilistic Graphical Models

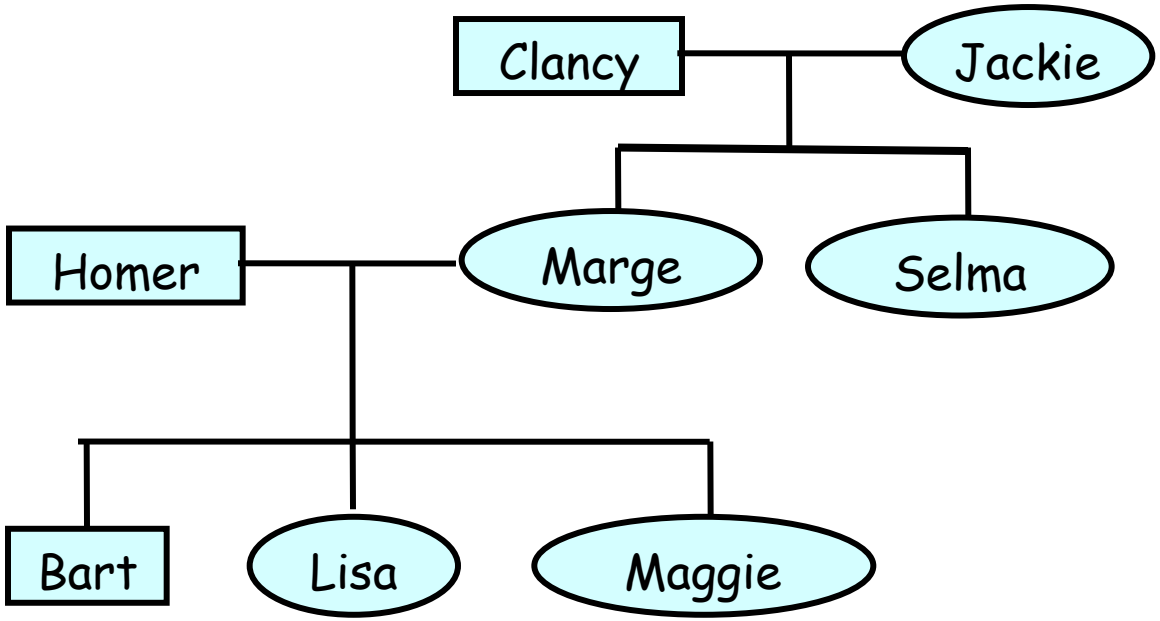


Representation

Template Models

Overview

Genetic Inheritance



pedigree
trait

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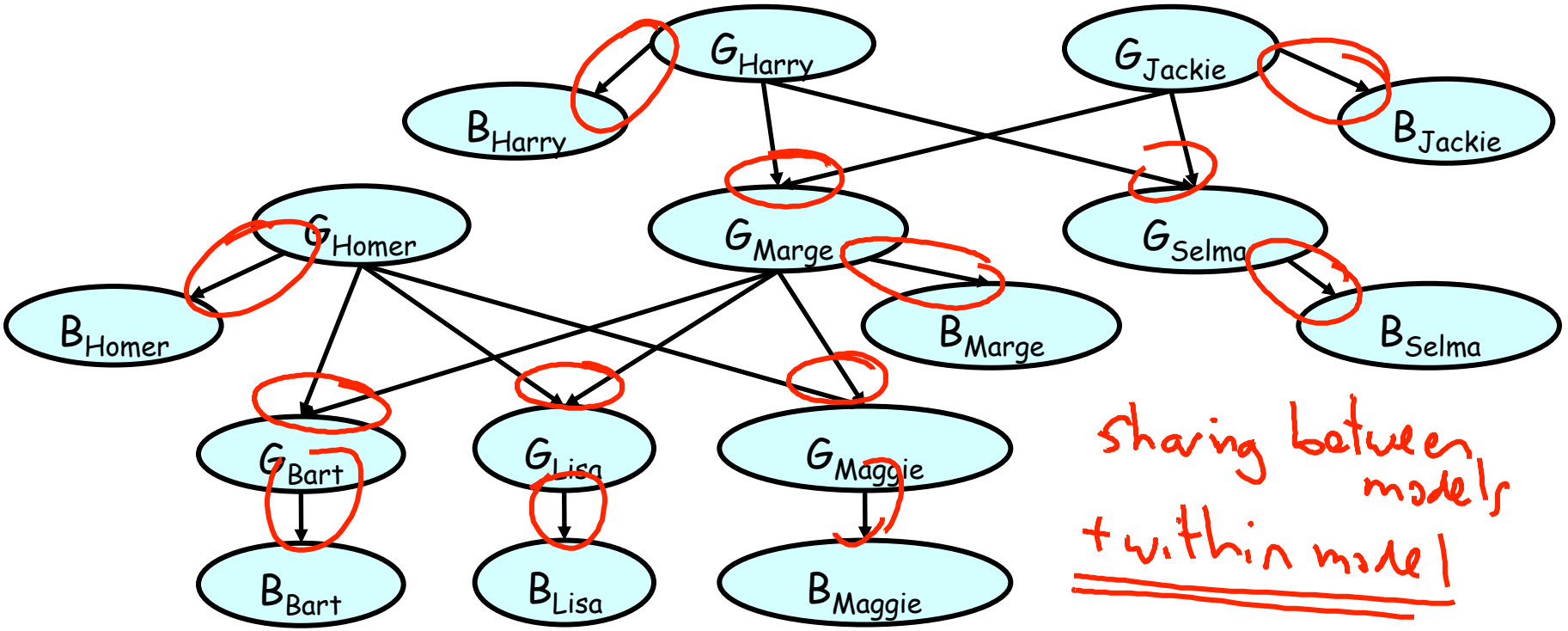
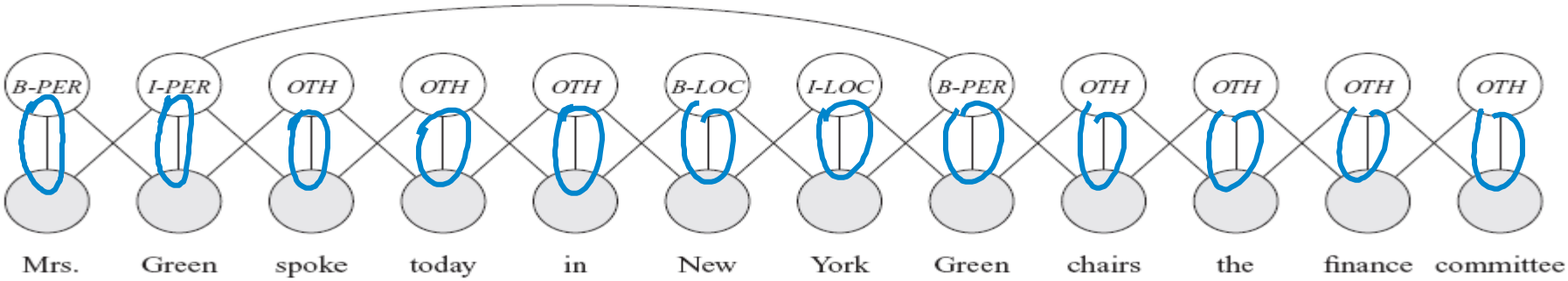
Genetic Inheritance



NLP Sequence Models



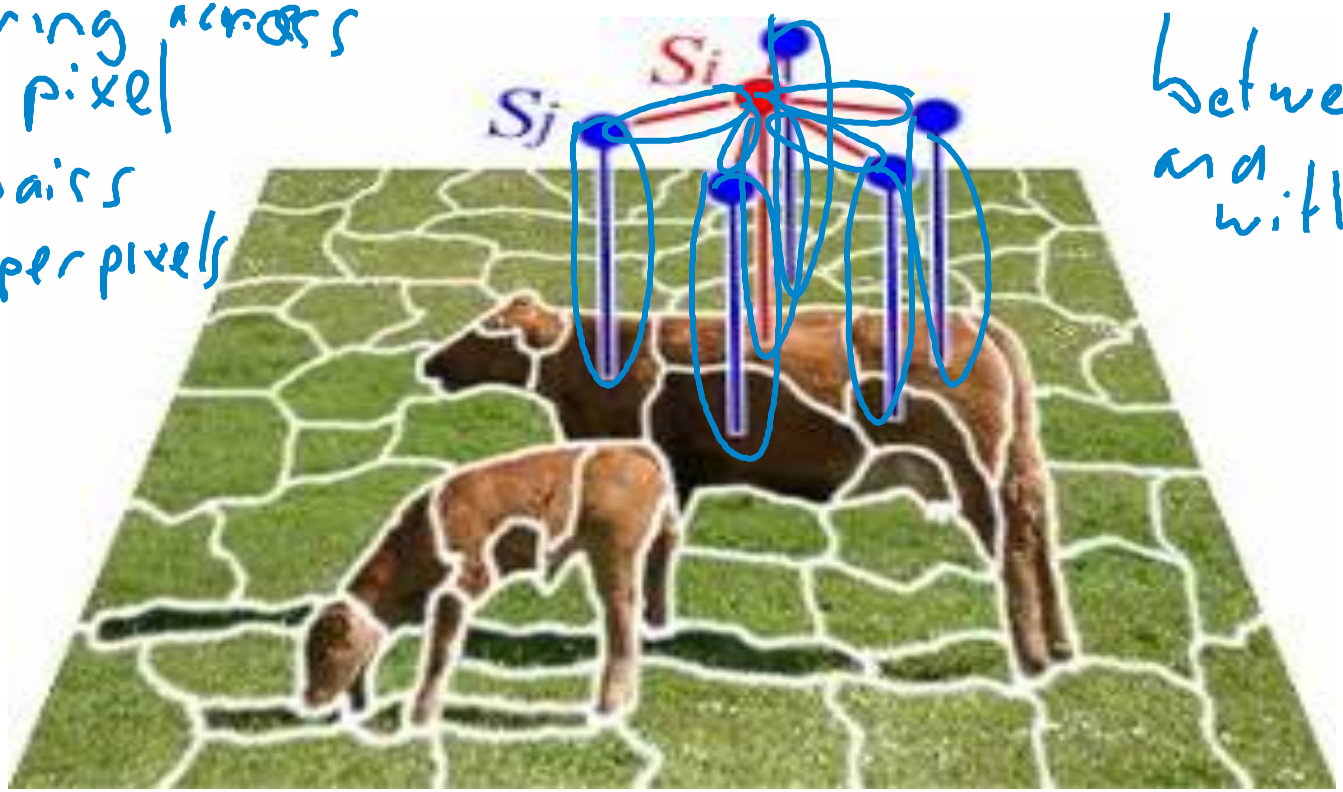
KEY

B-PER	Begin person name	*I-LOC*	Within location name
I-PER	Within person name	*OTH*	Not an entitiy
B-LOC	Begin location name		

Named entity recognition

Image Segmentation

sharing across pixel and pairs of superpixels



between and within

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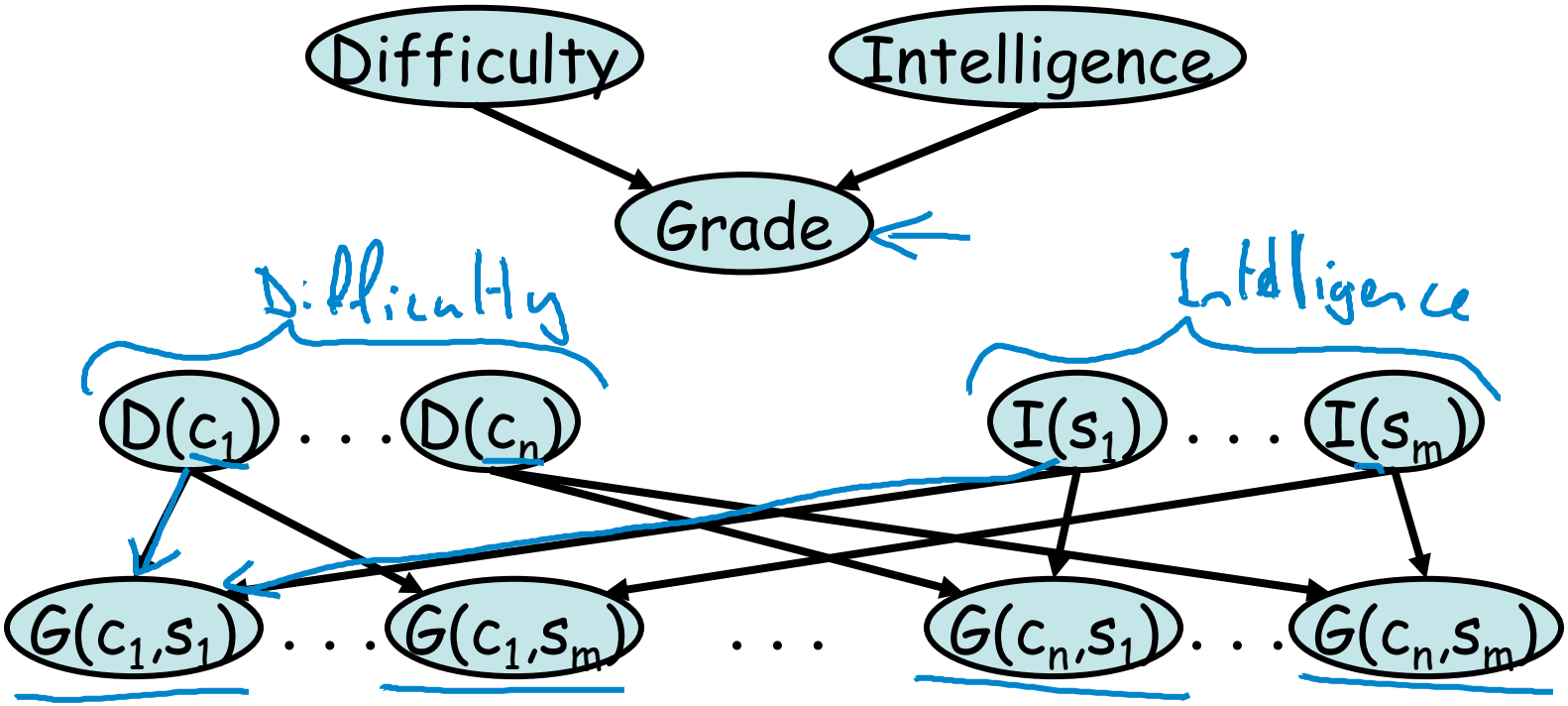
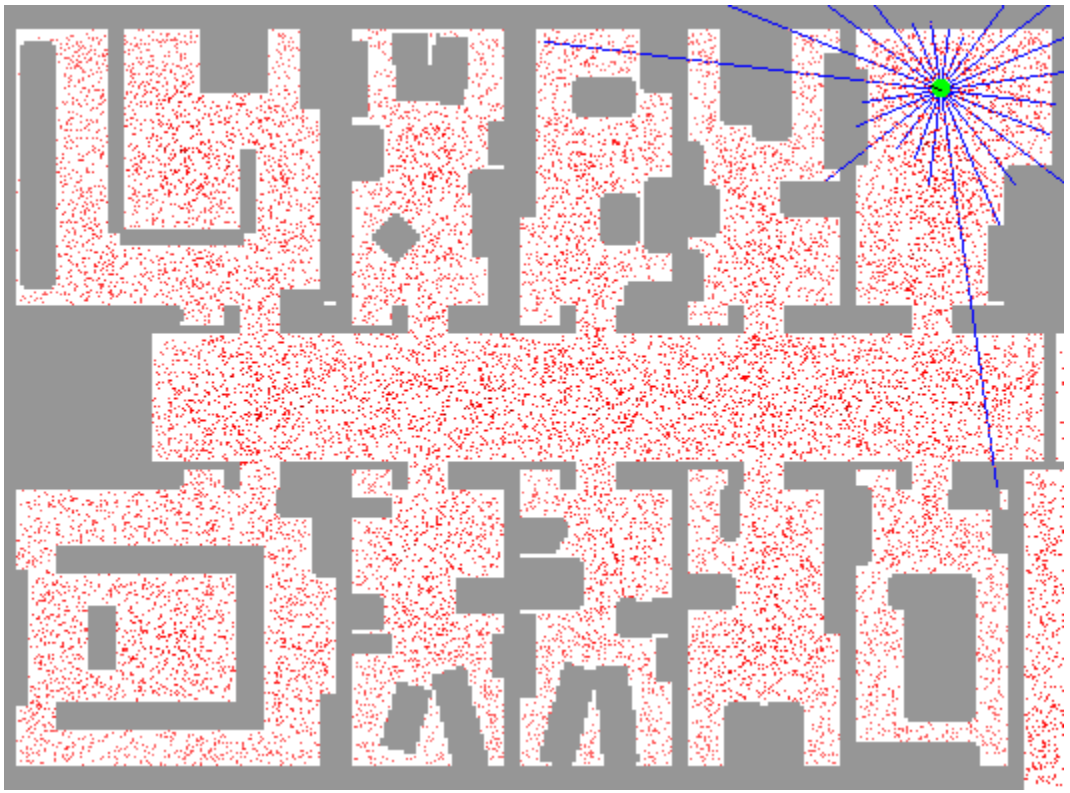
The University Example



Robot Localization

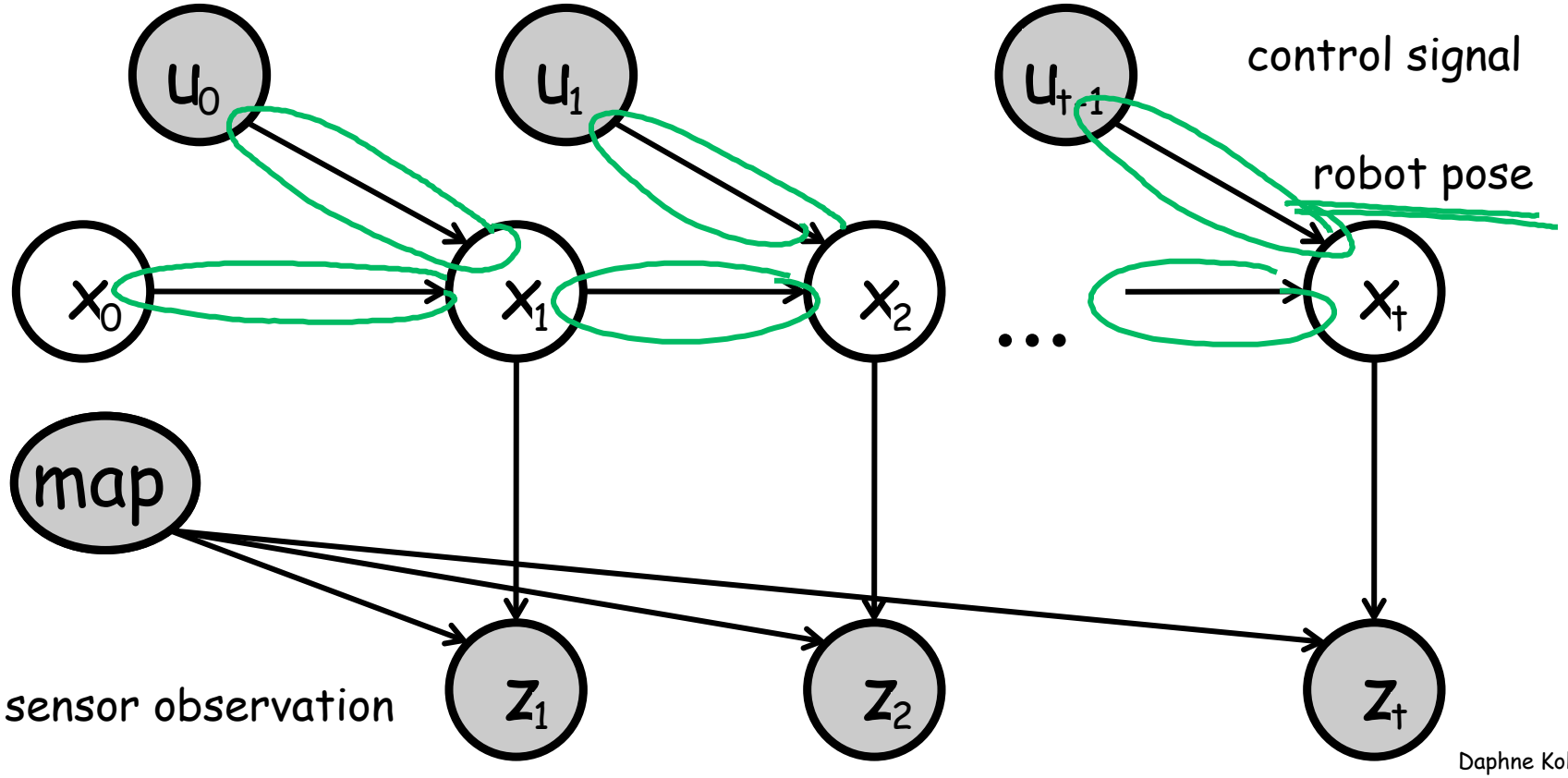
time series

position at time t changes over time robot dynamics are fixed



Fox, Burgard, Thrun

Robot Localization



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Template Variables

- Template variable $X(U_1,\ldots,U_k)$ is instantiated (duplicated) multiple times
  - Location(t), Sonar(t)
  - Genotype(person), Phenotype(person)
  - Label(pixel)
  - Difficulty(course), Intelligence(student), Grade(course, student)

Template Models

- Languages that specify how ground variables inherit dependency model from template
- Dynamic Bayesian networks ← temporal
- Object-relational models people, courses, pixels...
  - Directed
    - Plate models
  - Undirected