

# COMPLEX MODEL $\Rightarrow$ RICH PRIOR KNOWLEDGE

## COMPLEX GENERATIVE MODEL

**EXAMPLE:** Grammar  $\rightarrow$  sentence, Topic Model  $\rightarrow$  document

**GOOD:** Generative models are modular  $\Rightarrow$  compositional

**BAD:** Inference  $\Rightarrow$  hard (non-convex) problem

**PRIOR KNOWLEDGE:** Model structure & priors

## COMPLEX WORD FEATURE MODEL

**EXAMPLE:** Attributes  $\rightarrow$  Morphology, POS, NER, SynSet  
Relations  $\rightarrow$  WordNet, Ontology, Referred Object

**GOOD:** Rich set of features for words  $\Rightarrow \gg$  constraints

**BAD:** Intractability in traditional discrete modeling

**PRIOR KNOWLEDGE:** Attributes and relations relevant to task

# DEFINING SIMILARITY ALLOWS PK EXPLOITATION

## KERNEL OVER COMPLEX DATA STRUCTURE

**EXAMPLE:** Similar sentences  $\Rightarrow$  similar derivation (parse tree)  
Similar words  $\Rightarrow$  similar paths in ontology

**RELATIONS:** Similarity  $\Rightarrow$  dot product  $\Rightarrow$  kernel

**GOOD:** Kernels are compositional (i.e. hierarchically or  $\Sigma$ )

**BAD:** Generalization issues

**PRIOR KNOWLEDGE:** Choosing form of structural similarity

## JUST SPECIFY A SIMILARITY NOTION AND YOU GET:

- Implicit inference of latent variables from input
- Implicit feature selection
- Convex (regularized) optimization problem