Natural Language Semantics for Dependency Trees

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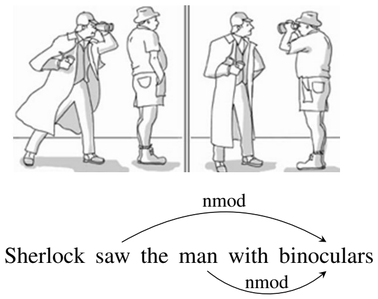
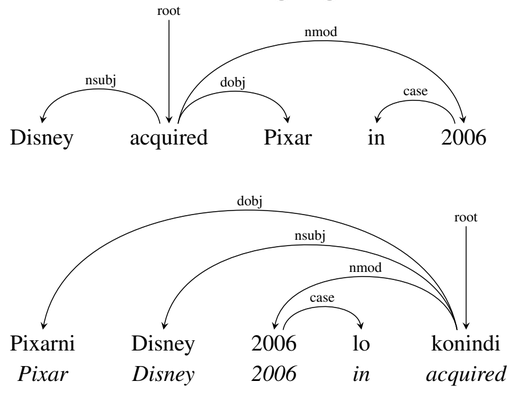
Dependency Trees help Semantics



Universal Dependencies

Homogeneous syntactic representation across languages



Cool Facts

Dependency trees are human-friendly

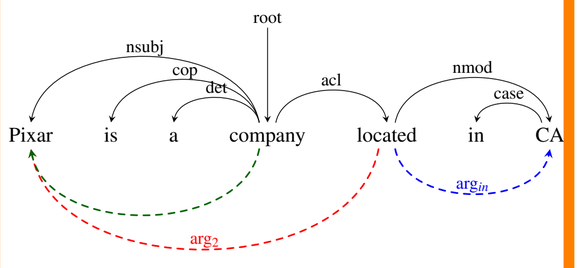
Treebanks in 40 languages

Accurate Parsers
e.g., Google's Parsey McParseface

Not cool enough :(

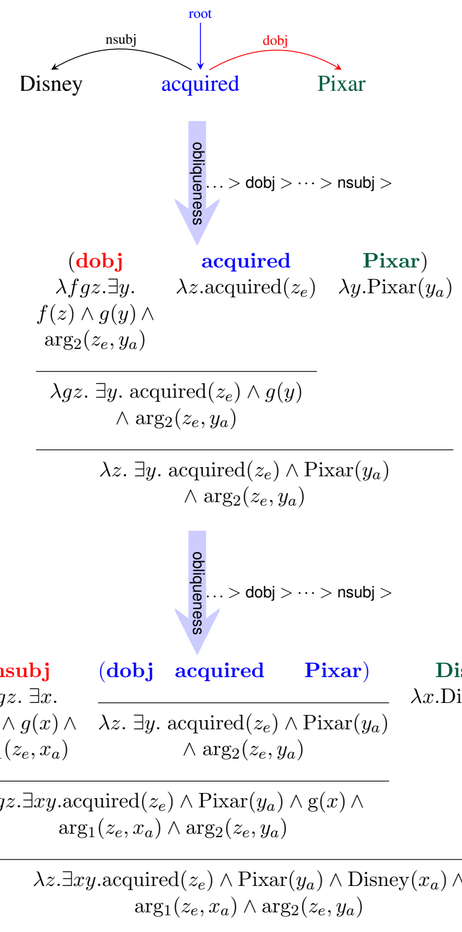
Dependencies lack a theory of semantics

No formal theory to convert to target-application's representation

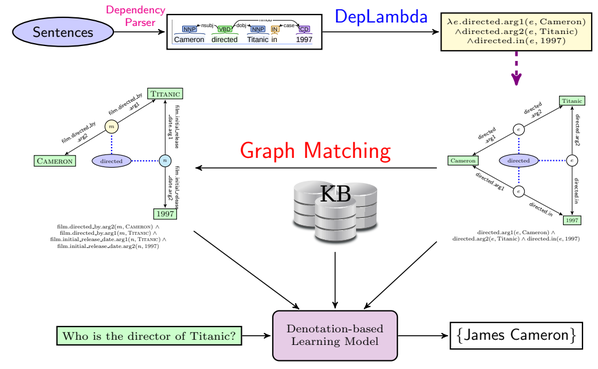


$\exists z.\text{company}(\text{Pixar}) \wedge \text{located}(z_e) \wedge \text{arg}_2(z_e, \text{Pixar}) \wedge \text{arg}_{\text{in}}(z_e, \text{CA})$

DepLambda: Dependencies to Logical Forms



Application: Freebase Question Answering



Multilingual QA Results

Test Data: WebQuestions – 2034 real Google Queries

	English	German	Spanish
Bag of Words	47.4	43.5	45.1
DepTree	47.8	43.7	45.7
DepLambda	**49.0**	**44.3**	**46.2**

The Future is bright..

Richer composition functions
e.g. Neural Networks, Tensors

Tree to Target Representation directly