

# Structured Prediction and PyStruct

Andreas Müller

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# Multi-Label Classification

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	Politics	Sports	Finance	Domestic	Religion
News Story1	1	0	0	1	1
News Story2	0	1	0	1	0
News Story3	0	0	1	0	0

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# Multi-Label Classification

	Politics	Sports	Finance	Domestic	Religion
News Story1	1	0	0	1	1
News Story2	0	1	0	1	0
News Story3	0	0	1	0	0

	Owns Car	Smokes	Married	Self-Employed	Has Kids
Customer1	1	0	1	0	1
Customer2	1	1	0	1	0
Customer3	0	1	1	0	0

# Sequence Tagging



# Sequence Tagging



Stroke cat.



Stroke cat.



Stroke cat.



Open trash can.



Put cat in trash can.

# Sequence Tagging



Stroke cat.



Stroke cat.



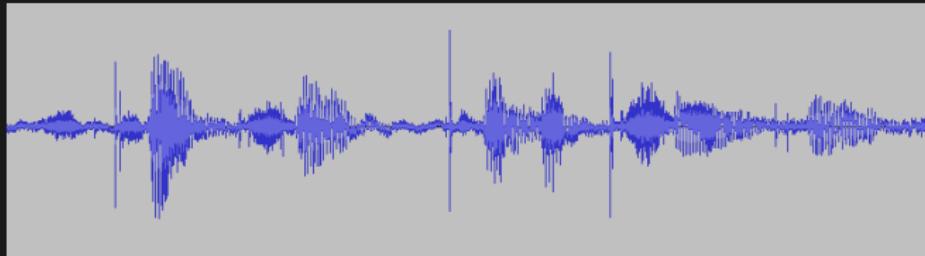
Stroke cat.



Open trash can.



Put cat in trash can.



# Sequence Tagging



Stroke cat.



Stroke cat.



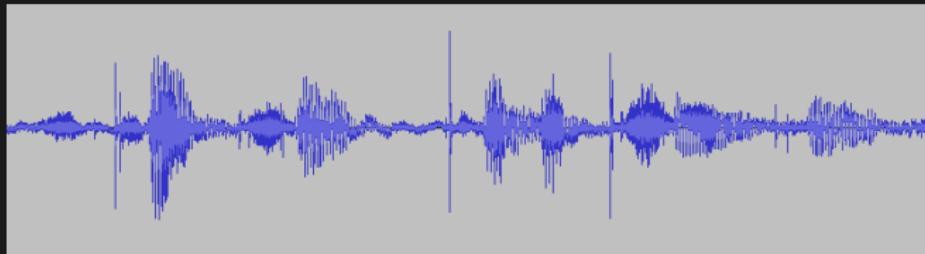
Stroke cat.



Open trash can.

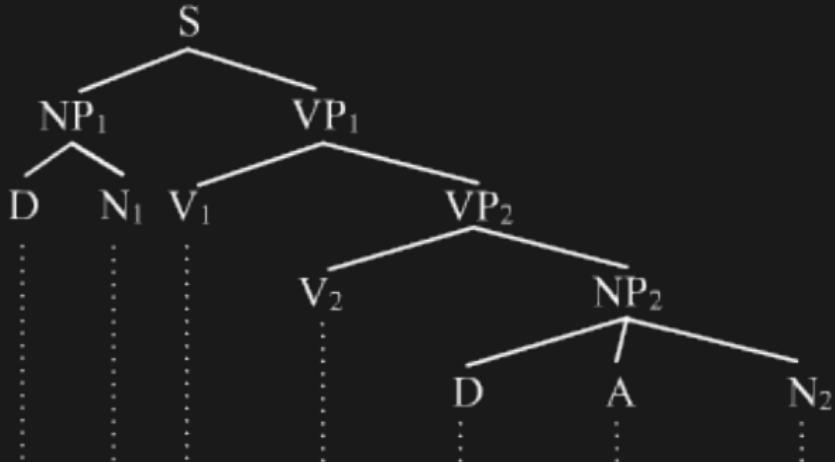


Put cat in trash can.



Struc-tured pre-dic-tion in Py-thon

# Predicting Parse Trees



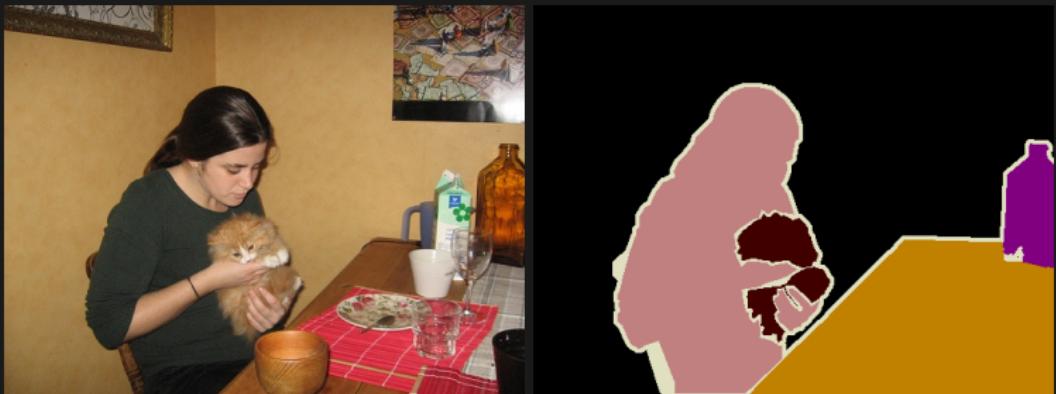
This tree is illustrating the constituency relation.

Constituency relation (PSG)

# Semantic Images Segmentation



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# Predicting Structured Objects

$$f(x, w) := \arg \max_{y \in \mathcal{Y}} g(x, y, w)$$

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If you like:

$$\arg \max_{y \in \mathcal{Y}} p(y|x, w)$$

$$f(x, w) := \arg \max_{y \in \mathcal{Y}} w^T \psi(x, y)$$

# Predicting discrete vectors

# Factor Graphs

# Inference in Trees

# Inference in General Graphs

# Probabilistic Learning

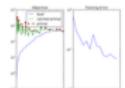
# Max-Margin Learning

# Simple structured prediction

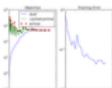
# Example OCR

# Example Snake

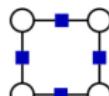
## Examples



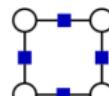
Plotting the objective and constraint caching in 1-slab SSVMs



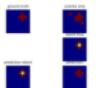
Efficient exact learning of 1-slab SSVMs



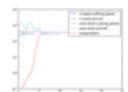
SVM as CRF



Semantic Image Segmentation on Pascal VOC



Latent Dynamics CRF



SVM objective values



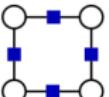
Learning directed interactions on a 2d grid



Learning interactions on a 2d grid



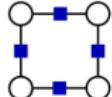
OCR Letter sequence recognition



Crammer-Singer Multi-Class SVM



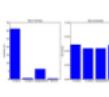
Latent SVM for odd vs. even digit classification



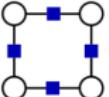
Mult-label classification



Latent Variable Hierarchical CRF



Binary SVM as SSVM



Comparing PyStruct and SVM-Struct