

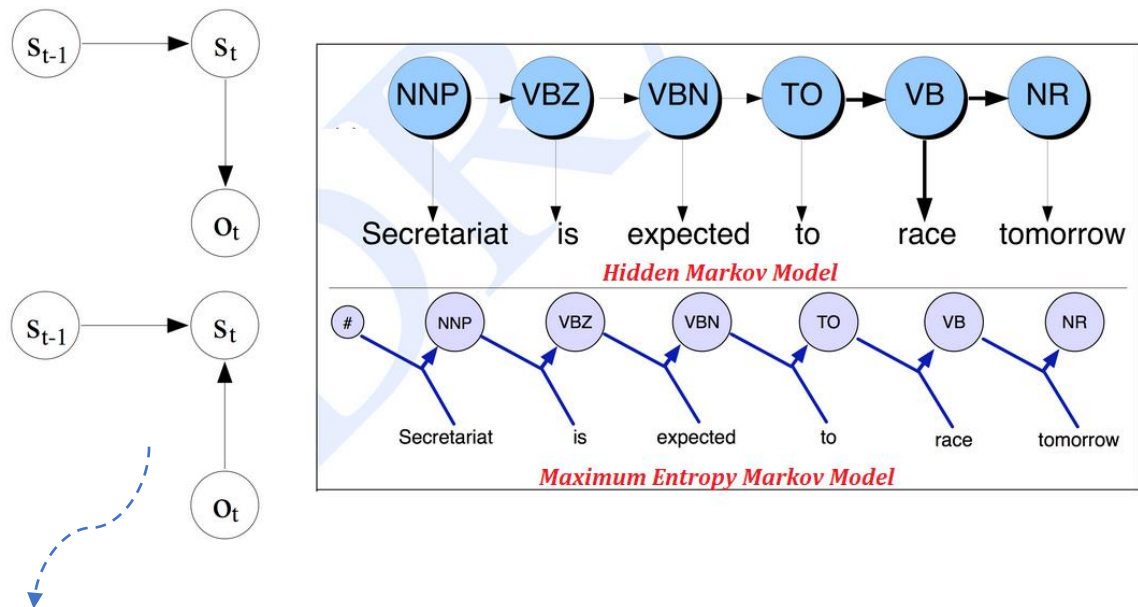
# Maximum Entropy Markov Model

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# Maximum Entropy Markov Model (MEMM) for Sequence Labeling

- Probabilistic sequence labeling model with finite hidden states
- Prediction of hidden states (labels) in address type query
- Multinomial logistic regression for classification integrating features of observations (tokens)
- Encode the most likely state sequence using Viterbi algorithm (i.e. state sequence in max. a posteriori probability)



$$P(S_t | S_{t-1}, O_t) = \frac{1}{Z(O_t, S_{t-1})} \exp\left(\sum_{i=1}^N w_i * f_i(O_t, S_{t-1})\right)$$

No	12	Bellary	Road	,	Hebbal	,	Bengaluru	560024	,	India
$O_1$	$O_2$	$O_3$	$O_4$	$O_5$	$O_6$	$O_7$	$O_8$	$O_9$	$O_{10}$	$O_{11}$
$H_1$	$H_2$	$H_3$	$H_4$	$H_5$	$H_6$	$H_7$	$H_8$	$H_9$	$H_{10}$	$H_{11}$
Str	Str	Str	Str	Str	Str	Str	Str	Str	Str	Str
City	City	City	City	City	City	City	City	City	City	City
Zip	Zip	Zip	Zip	Zip	Zip	Zip	Zip	Zip	Zip	Zip
Hnr	Hnr	Hnr	Hnr	Hnr	Hnr	Hnr	Hnr	Hnr	Hnr	Hnr
Del	Del	Del	Del	Del	Del	Del	Del	Del	Del	Del
Ctry	Ctry	Ctry	Ctry	Ctry	Ctry	Ctry	Ctry	Ctry	Ctry	Ctry

Probability of sequence   : 0.56

Probability of sequence   : 0.81

Sequence Labeling using MEMM for Address type queries  
(training data : ~2 million Amazon delivery queries in India)