

# Homework 7 – EM Algorithm

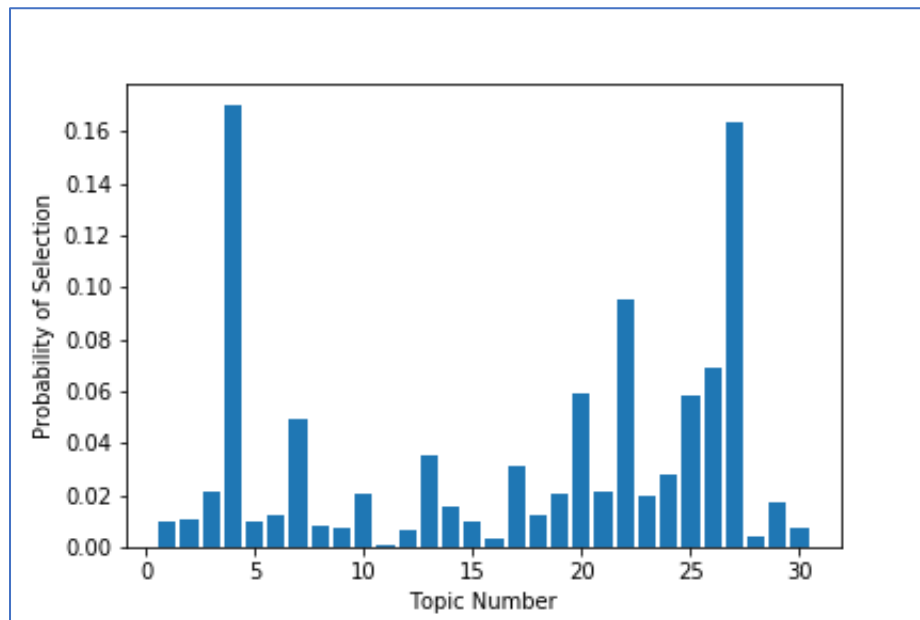
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CS 498 Applied Machine Learning

## EM Topic Models

Implementation for the multinomial mixture of topics model can be found in file EM\_TopicClustering.ipynb.

Probability of Topic Selection (30 topics)





model	learning	control	system	movement	network	motor	dynamic	forward	controller
neuron	network	model	input	neural	synaptic	function	spike	firing	system
training	error	network	set	learning	function	data	input	weight	neural
network	neural	input	function	system	learning	training	set	output	weight
region	texture	iiii	model	depth	contrast	image	frequency	local	visual
mean	field	distribution	network	model	gaussian	approximation	function	algorithm	learning
component	signal	eeg	independent	data	algorithm	artifact	ica	sources	information

The table above shows the top 10 words for each of the 30 topics

## Image Segmentation using EM

### Segmented Images for RobertMixed03

10 Segments



20 Segments



50 Segments



Original



The individual jpg files are attached separately in a zipped file.

## Segmented Images for smallstrelitzia

10 Segments



20 Segments



50 Segments



Original



The individual jpg files are attached separately in a zipped file.



## Segmented Images for smallsunset

10 Segments



20 Segments



50 Segments



Original



The individual jpg files are attached separately in a zipped file.

Segmented Images for smallsunset with different starting points :-



No there isn't much variation in the result. I have highlighted a few minor differences but there aren't too many differences in the 5 cases above.

## References:-

Data Source 1

<https://archive.ics.uci.edu/ml/datasets/Bag+of+Words>

Data Source 2

<http://luthuli.cs.uiuc.edu/~daf/courses/AML-18/EMHWPix/>

Code References –

<http://scikit-learn.org/stable/modules/generated/sklearn.cluster.KMeans.html>

<https://docs.scipy.org/doc/scipy-0.19.0/reference/generated/scipy.misc.logsumexp.html>

<https://docs.scipy.org/doc/scipy/reference/generated/scipy.spatial.distance.cdist.html#scipy.spatial.distance.cdist>

Piazza Posts like –

<https://piazza.com/class/jchzguhsowz6n9?cid=1192>

<https://piazza.com/class/jchzguhsowz6n9?cid=1121>

Course Book –

<http://luthuli.cs.uiuc.edu/~daf/courses/AML-18/learning-book-15-Jan.pdf>



