Homework 7 – EM Algorithm

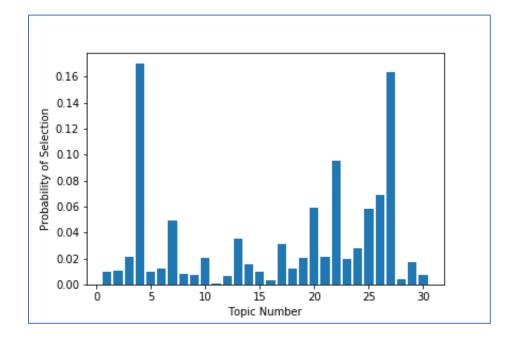
Heena Thakker

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)

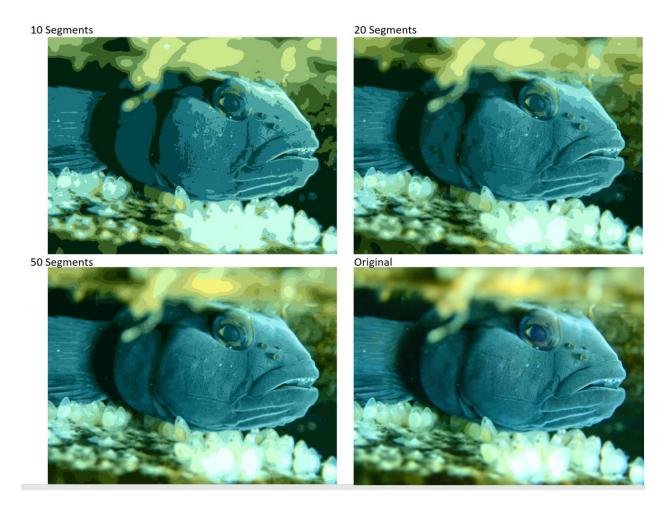


Word 1	Word 2	Word 3	Word 4	Word 5	Word 6	Word 7	Word 8	Word 9	Word 10
model	signal	sound	auditory	frequency	system	filter	output	input	analog
							·		
noise	signal	system	neural	information	neuron	input	model	analog	network
function	set	kernel	vector	data	algorithm	training	problem	svm	support
network	unit	input	learning	weight	function	output	neural	training	hidden
distance	tangent	set	transformation	vector	algorithm	model	point	learning	pattern
model	orientation	cortical	ocular	map	dominance	input	cell	pattern	visual
algorithm	function	learning	problem	vector	set	result	error	network	weight
point	manifold	space	model	set	data	image	dimensional	learning	algorithm
image	images	model	point	algorithm	system	map	scene	sensor	color
circuit	current	chip	input	voltage	output	analog	system	neural	network
bat	target	delay	echoes	echo	glint	image	simmon	range	neural
fatia		£:lb.a.u				ali akuilaki a .a	ala sa aita s		haaia
function	entropy	filter	gaussian	wavelet	approximation	distribution	density	component	basis
coll	model	innut	nouron	vicual	field	direction	custom	rosponso	notwork
cell	model	input	neuron	visual	Heiu	unection	system	response	network
word	character	network	recognition	training	system	set	input	neural	model
Word	Character	HELWOIK	recognition	training	Зузсен	300	прис	neurai	model
face	images	image	network	recognition	set	svstem	facial	representation	faces
lace	mages	mage	network	recognition	360	3,3.0	Taciai	representation	14663
target	cues	cue	search	model	visual	location	display	feature	system
									.,
speech	network	system	recognition	training	model	hmm	neural	set	speaker
•		,	<u> </u>						
input	map	network	task	output	pattern	unit	learning	system	feature
				•	•			•	
object	model	view	network	visual	unit	recognition	image	representation	features
learning	function	action	algorithm	policy	system	problem	optimal	reinforcement	model
data	algorithm	model	set	cluster	clustering	learning	function	point	problem
model	data	parameter	network	set	algorithm	learning	function	neural	number
motion	direction	visual	model	unit	field	system	network	velocity	cell

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
Hetwork	Heurai	прис	Tuticuoti	зузсени	icarriirig	tranning	361	σαιραι	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



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

Segmented Images for smallstrelitzia



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

Segmented Images for smallsunset



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

 $\frac{\text{https://docs.scipy.org/doc/scipy/reference/generated/scipy.spatial.distance.cdist.html\#scipy.spatial.distance.cdist.html\#scipy.spatial.distance.cdist.html#scipy.spatial.d$

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