ELEN 4903: Machine Learning
Homework 5

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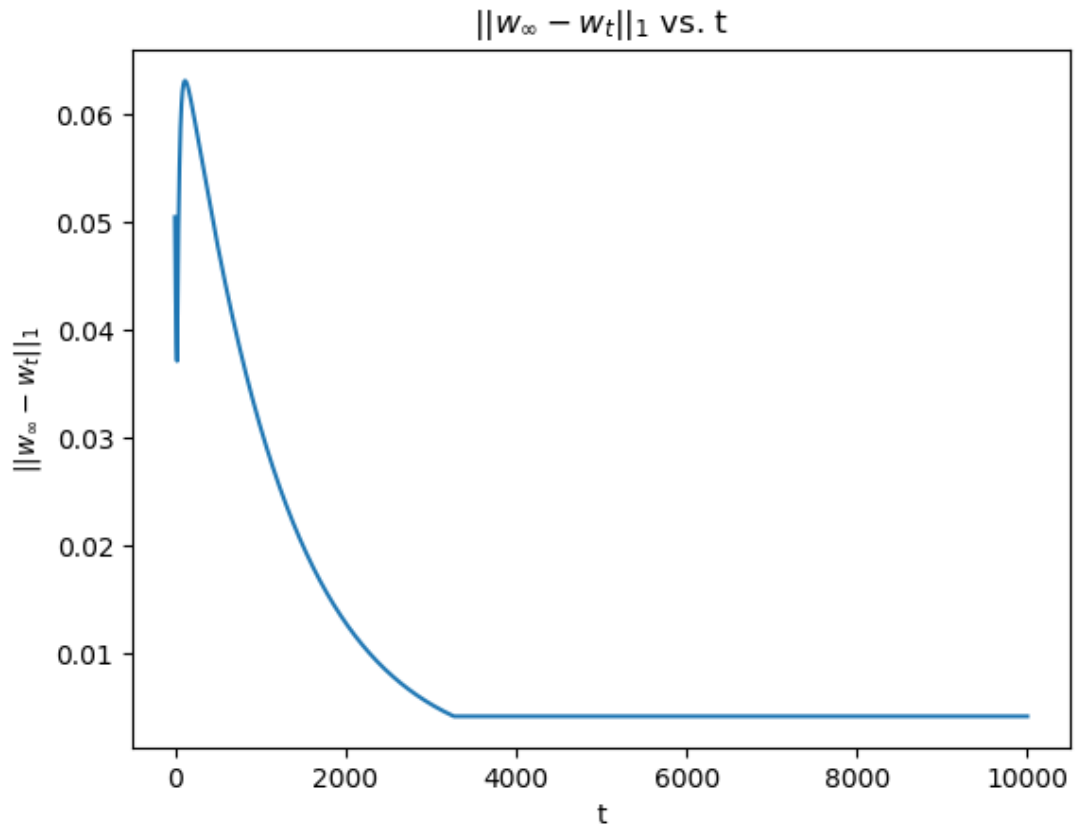
April 30, 2018

Problem 1
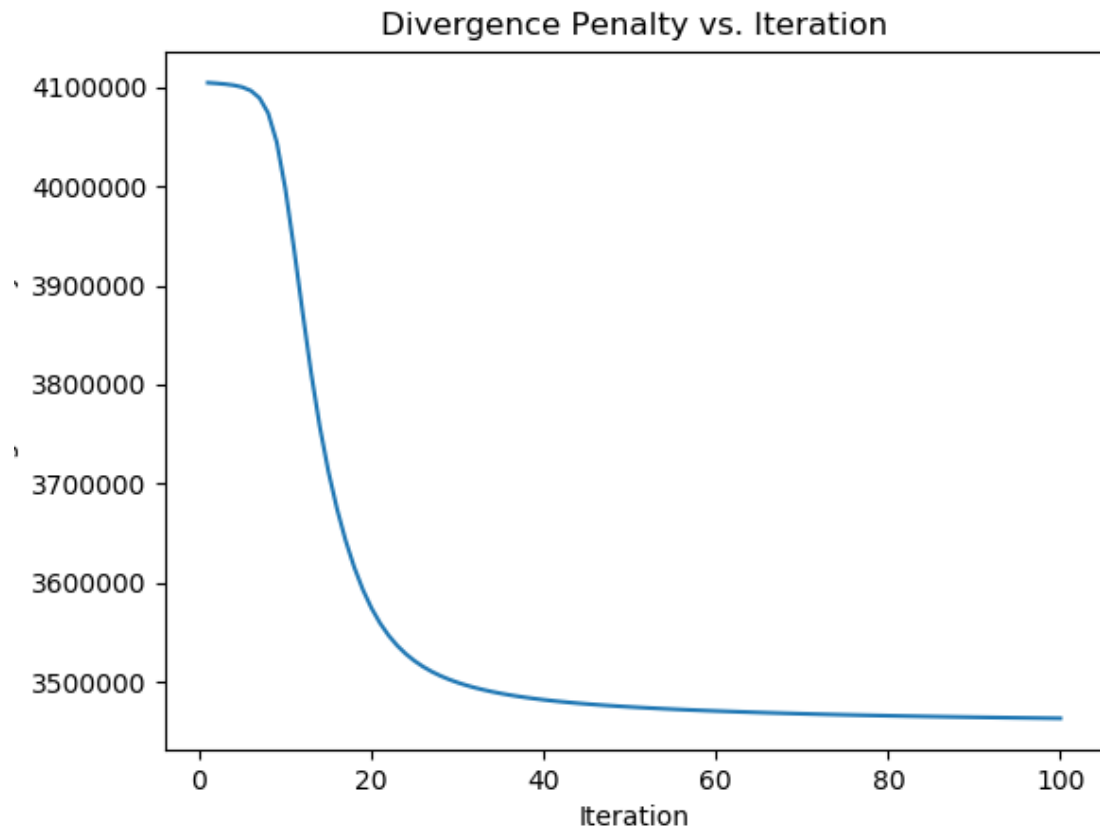**1 a.)**

	t = 10	Weight	t = 100	Weight	t = 1000	Weight	t = 10000	Weight
0	MountUnion	6.516312	MountUnion	25.217636	Alabama	16.279713	Alabama	19.684617
1	MaryHardin-Baylor	5.551792	Alabama	8.741666	Georgia	13.446352	Georgia	16.242606
2	StFrancisIN	4.261874	Georgia	7.325537	MountUnion	13.100553	OhioState	12.925730
3	TAMU-Commerce	3.662687	UW-Oshkosh	6.853581	OhioState	10.676810	Clemson	12.513903
4	Morningside	3.497385	OhioState	5.649857	Clemson	10.354820	Oklahoma	12.190421
5	UW-Oshkosh	3.484265	Clemson	5.602786	Oklahoma	10.078867	Wisconsin	11.973080
6	BrockportSt	3.429082	Oklahoma	5.402382	Wisconsin	9.889724	CentralFlorida	11.095036
7	Alabama	3.384542	Wisconsin	5.231570	CentralFlorida	9.181140	Auburn	10.207756
8	Georgia	3.187408	CentralFlorida	4.966417	Auburn	8.444737	PennState	9.254025
9	NorthDakotaSt	3.128789	TAMU-Commerce	4.936298	PennState	7.647384	NotreDame	6.951105
10	DelawareValley	3.029214	MaryHardin-Baylor	4.902536	NotreDame	5.751573	TCU	6.628526
11	JamesMadison	3.001789	Auburn	4.553023	TCU	5.485228	MiamiFL	5.536767
12	IndianaPA	2.908603	StFrancisIN	4.368399	MiamiFL	4.582916	MichiganSt	5.483922
13	Clemson	2.736895	PennState	4.069769	MichiganSt	4.532560	OklahomaSt	5.251388
14	CentralFlorida	2.728425	BrockportSt	3.677426	OklahomaSt	4.346470	Iowa	4.972841
15	MinnSt-Mankato	2.651069	NotreDame	3.112450	Iowa	4.109518	Northwestern	4.815756
16	OhioState	2.577722	DelawareValley	3.089730	Northwestern	3.978971	IowaSt	4.763879
17	Wartburg	2.576888	NorthDakotaSt	3.036908	IowaSt	3.945878	LSU	4.453704
18	Wisconsin	2.492145	MinnSt-Mankato	3.021946	LSU	3.685922	SouthernCal	4.405231
19	Oklahoma	2.281399	FrostburgSt	3.018470	NorthDakotaSt	3.655271	Washington	4.309790
20	StThomas	2.279367	TCU	2.973840	SouthernCal	3.649412	NorthDakotaSt	4.212833
21	Assumption	2.236307	CaseWesternReserve	2.738642	Washington	3.574862	Stanford	4.062476
22	Reinhardt	2.209311	JohnCarroll	2.628359	UW-Oshkosh	3.556694	MississippiSt	3.973308
23	Ashland	2.134302	Harding	2.542208	Stanford	3.365975	VirginiaTech	3.874240
24	FrostburgSt	2.110615	MiamiFL	2.491425	MississippiSt	3.288632	NorthCarolinaSt	3.695297

1 b.)

$||w_\infty - w_t||_1$ vs. t

Problem 2

2 a.)

Divergence Penalty vs. Iteration

2 b.)

	Topic 1	Weight	Topic 2	Weight	Topic 3	Weight	Topic 4	Weight	Topic 5	Weight
0	mile	0.009079	building	0.020044	case	0.021812	health	0.023807	thing	0.023071
1	car	0.008975	city	0.019836	lawyer	0.019416	drug	0.022479	really	0.014878
2	hour	0.008936	build	0.014782	court	0.019128	doctor	0.017969	feel	0.014279
3	walk	0.008218	area	0.013240	law	0.015836	care	0.016811	lot	0.013902
4	drive	0.008068	house	0.012247	charge	0.014914	medical	0.016094	ask	0.011848
5	stop	0.007343	resident	0.010329	judge	0.013662	patient	0.014594	put	0.011464
6	night	0.006896	site	0.009586	legal	0.010449	treatment	0.013499	little	0.011429
7	morning	0.006808	home	0.009452	trial	0.009496	group	0.012797	happen	0.010501
8	home	0.006613	project	0.009154	file	0.008353	hospital	0.011989	hard	0.010265
9	head	0.006599	space	0.008857	state	0.008307	woman	0.010870	keep	0.010167

	Topic 6	Weight	Topic 7	Weight	Topic 8	Weight	Topic 9	Weight	Topic 10	Weight
0	deal	0.017574	life	0.018329	percent	0.022562	government	0.016489	test	0.013056
1	contract	0.017346	man	0.016973	market	0.020004	american	0.015178	problem	0.010229
2	agreement	0.016867	woman	0.015969	price	0.017951	states	0.015061	study	0.009557
3	announce	0.013528	love	0.014892	sale	0.016314	military	0.014389	system	0.008557
4	official	0.013331	young	0.014193	company	0.015406	war	0.013579	research	0.008386
5	meeting	0.012686	friend	0.011123	industry	0.013403	country	0.012359	expert	0.008283
6	plan	0.012611	child	0.010843	increase	0.011691	force	0.010467	develop	0.007771
7	decision	0.012298	family	0.010328	states	0.011260	official	0.010069	report	0.007539
8	sign	0.011957	story	0.009536	sell	0.010285	leader	0.008438	result	0.007373
9	agree	0.011391	character	0.009446	product	0.008934	international	0.008059	cause	0.006574

	Topic 11	Weight	Topic 12	Weight	Topic 13	Weight	Topic 14	Weight	Topic 15	Weight
0	american	0.009478	company	0.040629	television	0.022156	computer	0.014547	game	0.024463
1	history	0.008833	executive	0.029862	tell	0.019528	company	0.012306	team	0.020257
2	country	0.008115	president	0.021094	speak	0.015230	service	0.011392	play	0.019408
3	world	0.007782	business	0.019609	reporter	0.013240	system	0.009321	win	0.016608
4	life	0.006564	chief	0.017244	ask	0.013026	customer	0.009171	player	0.016042
5	society	0.006139	chairman	0.013172	interview	0.012610	offer	0.009059	season	0.015931
6	social	0.005914	share	0.012073	news	0.012393	internet	0.008231	second	0.013685
7	view	0.005733	firm	0.011835	word	0.007621	site	0.008032	victory	0.009913
8	black	0.005729	vice	0.011404	message	0.006956	information	0.007399	score	0.009138
9	political	0.005706	management	0.010714	night	0.006827	technology	0.007341	coach	0.008708

	Topic 16	Weight	Topic 17	Weight	Topic 18	Weight	Topic 19	Weight	Topic 20	Weight
0	food	0.019645	rate	0.025371	music	0.021528	art	0.014308	water	0.023012
1	restaurant	0.016215	percent	0.023692	play	0.016372	design	0.011510	pound	0.013300
2	table	0.014736	bank	0.020830	performance	0.012951	artist	0.010247	heat	0.010245
3	dinner	0.014361	market	0.015549	production	0.010135	color	0.009898	inch	0.009721
4	eat	0.013617	interest	0.013465	film	0.009981	image	0.009436	cut	0.009196
5	serve	0.010953	rise	0.013227	audience	0.009792	collection	0.008410	add	0.009007
6	room	0.010405	bond	0.012854	theater	0.009410	display	0.008158	oil	0.008865
7	lunch	0.009585	fund	0.012314	dance	0.009136	fashion	0.007922	minute	0.008723
8	taste	0.009484	price	0.011962	perform	0.009115	photograph	0.007767	dry	0.008612
9	drink	0.008923	stock	0.011568	song	0.009033	exhibition	0.007487	plant	0.008409

	Topic 21	Weight	Topic 22	Weight	Topic 23	Weight	Topic 24	Weight	Topic 25	Weight
0	state	0.016749	police	0.035537	campaign	0.019768	school	0.053834	editor	0.038837
1	pay	0.015042	official	0.022596	political	0.019089	student	0.039400	book	0.033824
2	money	0.015011	officer	0.020165	vote	0.018283	mrs	0.033327	write	0.032529
3	program	0.013435	city	0.017036	election	0.014493	father	0.031630	article	0.026284
4	budget	0.011934	man	0.014315	party	0.014241	graduate	0.028081	letter	0.019860
5	tax	0.010936	yesterday	0.014253	republican	0.013733	son	0.026596	page	0.018797
6	bill	0.010848	arrest	0.012922	candidate	0.013573	mother	0.020874	publish	0.017505
7	cost	0.010508	fire	0.012444	leader	0.012192	daughter	0.020350	writer	0.017269
8	plan	0.009687	kill	0.012076	democratic	0.011304	child	0.020315	newspaper	0.014134
9	cut	0.009428	spokesman	0.011289	support	0.009936	college	0.019740	read	0.013319