

Project ML Part 2

Wesley Tomjack

1) Similarity Score for Male/Female

Word	Similarity Score (Male)	Similarity Score (Female)
son	0.32468474	0.2588695
daughter	0.23304707	0.37830427
child	0.33342198	0.5898086
queen	0.11041949	0.22857244
king	0.26449707	0.122528546
man	1	0.5876938
woman	0.5876938	0.99999994
marriage	0.20439342	0.42923912
birth	0.12343917	0.42030877
doctor	0.28924733	0.19613354
nurse	0.15348099	0.25435838
teacher	0.09874005	0.2040782
engineer	0.08736356	0.044264376
scientist	0.112269185	0.13731062
president	0.09457928	0.08462686

2) BATS word Test

a. (File Used: "I08 [verb_Ving - 3pSg]")

Target Word	Comparison Word	Score
adding	adds	0.38762787
advertising	advertises	0.31977493
allowing	allows	0.6456391
appearing	appears	0.3327149
applying	applies	0.5106885
asking	asks	0.66908616
becoming	becomes	0.52842253
believing	believes	0.58931565
considering	considers	0.43917692
consisting	consists	0.7074022
containing	contains	0.5505504
continuing	continues	0.5092373
creating	creates	0.41957304
depending	depends	0.70422983
describing	describes	0.5861201

developing	develops	0.3090212
discovering	discovers	0.44266605
enabling	enables	0.5128758
existing	exists	0.19481833
explaining	explains	0.50290704
following	follows	0.25188655
happening	happens	0.5278023
hearing	hears	0.41714835
improving	improves	0.48504123
including	includes	0.4192305
involving	involves	0.4407994
learning	learns	0.07802349
losing	loses	0.41287735
managing	manages	0.34365344
occurring	occurs	0.5434443
operating	operates	0.26599988
performing	performs	0.37793925
promoting	promotes	0.4868223
providing	provides	0.62182087
publishing	publishes	0.38759145
receiving	receives	0.5058272
reducing	reduces	0.626766
referring	refer	0.63377756
relating	relates	0.31641254
remaining	remains	0.16905737
representing	represents	0.5215348
requiring	requires	0.52781004
seeming	seems	0.3744911
sittings	sits	0.5469824
spending	spends	0.50471807
suggesting	suggests	0.57810736
teaching	teaches	0.45978037
telling	tells	0.5531911
thanking	thanks	0.27556065
understanding	understands	0.36936128

b. (Protected Class: Gender, Subgroups: 'Male', 'Female', 'Transgender')

Target Word	(Male) Score	(Female) Score	(Transgender) Score
adding	0.06120715	0.05875042	-0.04249002
advertising	-0.004702	0.01850695	0.18651672
			-
allowing	0.00306259	0.012416294	-0.06381466
appearing	0.13260584	0.12041168	0.1445399

applying	-0.082547	-0.09887174	-0.02359219
		-	
asking	-0.0421289	0.084524274	0.10970702
becoming	0.11694063	0.082233235	-0.09951601
		-	
believing	-0.024634	0.059616715	0.16748428
considering	0.02234553	-0.03154094	-0.028782658
consisting	0.04290186	0.046656728	-0.070465006
containing	0.01069045	0.055395633	-0.06214096
continuing	-0.0058304	0.039688796	0.058755144
creating	0.02631021	0.011976188	-0.06174846
		-	
depending	0.10162599	0.001119714	-0.03457266
		-	
describing	-0.0182623	0.042821743	0.08341269
developing	0.12830296	0.20716931	0.06312115
discovering	-0.0551523	-0.06980973	0.073330164
enabling	0.04178069	0.013276255	0.03849145
existing	0.05275948	0.06814274	0.004784333
explaining	-0.130665	-0.16025697	0.051311374
following	0.05481966	0.049007393	-0.06852652
		-	
happening	-0.0265287	0.052355267	0.08041089
hearing	0.05871181	0.04043067	0.06919977
improving	0.03510749	0.008791651	0.08595815
including	0.06419596	0.08385286	0.17157361
involving	0.05964807	0.05834725	0.25325918
		-	
learning	0.03953308	0.025060588	0.06622848
losing	0.07154512	0.04990113	-0.1006117
managing	-0.0247145	-0.01671249	0.13603897
occurring	0.06457984	0.05361583	-0.016207391
operating	-0.0212272	0.02812908	-0.12469744
performing	0.1064146	0.078618996	0.057113804
		-	
promoting	-0.0070888	0.062068533	0.30082783
		-	
providing	-0.032735	0.021838965	0.006896594
publishing	0.06436721	0.10290993	-0.010804974
receiving	0.05733425	0.055102035	-0.05462654
		-	
reducing	0.03116031	0.031778023	-0.017437514
referring	0.091796	0.07382621	0.08200359
		-	
relating	-0.0512662	0.074660756	0.3376598
remaining	0.15412085	0.1345785	-0.124103576

representing	0.11765364	0.10863125	0.038220797
requiring	0.01449535	-0.03816164	0.08698261
seeming	0.07253005	0.003394385	0.17402376
		-	
sittings	-0.0048622	0.019421287	-0.15698197
		-	
spending	0.01192096	0.000997367	-0.08963518
		-	
suggesting	-0.1288387	0.119520225	0.103578836
		-	
teaching	0.02347231	0.015236186	0.121042326
telling	-0.0107891	0.004819728	0.05818535
thanking	-0.082025	-0.12245614	0.14259976
		-	
understanding	0.05531937	0.009999135	0.04559432

3) Sentences

a. Personal Analogy words

Target Word	Comparison Word	Similarity Score
king	queen	0.5685571
liquid	solid	0.6546474
sad	happy	0.44885093
teacher	school	0.5326567
japan	sushi	0.01186634
dog	shelter	0.1821038
sky	blue	0.4439698
judge	bench	0.30267337
genius	fool	0.2718964
jail	officer	0.27389795
line	square	0.19263238
dutch	denmark	0.22202154
computer	cd	0.23679918
house	person	0.116791084
sickness	health	0.19527604

b. WordVec2 Model Analogy Word Choice

Analogy	Model Word	Score
man is to woman as king is to	queen	0.553245425
water is to ice as liquid is to	solid	0.450003892
bad is to good as sad is to	glory	0.440381736
nurse is to hospital as teacher is to	institution	0.482898146
usa is to pizza as japan is to	dishes	0.576350689
human is to house as dog is to	hound	0.423166454
grass is to green as sky is to	blue	0.547864318
king is to throne as judge is to	prosecution	0.518645883
giant is to dwarf as genius is to	theorist	0.428088903
college is to dean as jail is to	peress	0.544442534
arc is to circle as line is to	lines	0.428752631
French is to France as Dutch is to	netherlands	0.604468107
video is to cassette as computer is to	peripherals	0.665450752
universe is to planet as house is to	houses	0.42647028
poverty is to wealth as sickness is to	impious	0.496061027

c. **Correlation**

- i. **There was a strong correlation between the vector of words I selected and the model generated similarities. (~.73)**

4) **Images Distinction**

- a. (To Note, there were 2 rows in the 61-80 category that weren't delimited properly in the race category. Those were subsequently switched to Other category)

Age Group	0-20	21-40	41-60	61-80	81+	Total
Female	2326	1632	751	466	232	5407
Male	1941	901	914	503	114	4373
Black	160	100	75	55	15	405
White	1931	1034	1252	794	255	5266
Asian	1017	349	88	47	52	1553
Indian	607	598	162	63	22	1452
Others	552	452	88	11	2	1103
Total	4267	2533	1665	969	346	9780

b. **Largest Subgroups**

- i. Age: 0-20 (4267)
- ii. Gender: Female (5407)
- iii. Race: White (5266)

d. **Smallest Subgroups**

- i. Age: 81+ (346)
- ii. Gender: Male (4373)
- iii. Race: Black (405)

- e. Which group will be impacted the most
 - i. The black subgroup will definitely be impacted the most as there's much less representation within the provided dataset for which to train a model. Meaning seemingly small/meaningless features may alter the model's perceived classifications in much more drastic fashion than they otherwise would for other groups.
 - ii. Right up there with the black subgroup would be that of the 81+ age subgroup, as they have even smaller representation than the aforementioned group.