

Q8:

Two new relation groups were created titled 'game' and 'position'. Three analogies were created for each of the two relation groups.

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: game
football feet basketball hands
baseball hands football feet
basketball ball game computer

: position
professor teachers graduate students
doctor treat teacher education
army troops battle fight
```

The resulting vectors obtained for each of the analogies and observations are as follows:

Result of group: game

```
['football', 'feet', 'basketball', 'hands']
[('coach', 0.41096582888537797), ('baseball', 0.4105396533869852),
('basketball', 0.3992927872052585), ('professional',
0.3777094644451008), ('pro', 0.3710928356957741), ('soccer',
0.3590525790901223), ('hockey', 0.3560066878374738), ('training',
0.35029275274634253), ('team', 0.3472668202690468), ('respect',
0.3401824955939331)]
['baseball', 'hands', 'football', 'feet']
[('miles', 0.703533591604179), ('pounds', 0.5794145849478899),
('acres', 0.544301865830452), ('$ ', 0.5338792519790008),
('minutes', 0.5006544724825243), ('cents', 0.4672205182192745),
('route', 0.4469090591807252), ('roughly', 0.44536240003827704),
('games', 0.44495875122928186), ('races', 0.4307758043123561)]
['basketball', 'ball', 'game', 'computer']
[('communications', 0.6244110738404101), ('marketing',
0.5544215010079002), ('electronic', 0.5441400238135654), ('sports',
0.5127554515896549), ('itunes', 0.509760734803688),
```

```
('entertainment', 0.5083209499105433), ('professional',  
0.5058672672183565), ('mobile', 0.5031028689704854), ('software',  
0.486530088020468), ('online', 0.47952061147606756)]
```

Result of group: position

```
['professor', 'teachers', 'graduate', 'students']  
[('harvard', 0.6851504101743545), ('yale', 0.625029978101506),  
( 'student', 0.6242564163656537), ('university',  
0.5943918179569279), ('teacher', 0.5929818389155728), ('graduate',  
0.5907551611170765), ('dean', 0.5648685673284141), ('expert',  
0.5594245389740029), ('princeton', 0.550197044269185), ('dr.',  
0.5393089198453597)]  
['doctor', 'treat', 'teacher', 'education']  
[('student', 0.5981453441397139), ('teacher', 0.5954608635708862),  
( 'harvard', 0.5833347589436433), ('college', 0.5066213587118126),  
( 'math', 0.5001493876483247), ('school', 0.49942145035355245),  
( 'degree', 0.4947694240397971), ('columbia', 0.48526525108316015),  
( 'yale', 0.4763709333117545), ('affairs', 0.47090646782042767)]  
['army', 'troops', 'battle', 'fight']  
[('battle', 0.3926435622370265), ('assistant',  
0.39236538153847994), ('case', 0.3798641438417839), ('coalition',  
0.3685088624173214), ('beat', 0.3644373082970581), ('criminal',  
0.3504686383844966), ('defense', 0.34802084234892966), ('trial',  
0.3426245607791076), ('act', 0.340493488752515), ('justice',  
0.33934809767504504)]
```

The prediction accuracy as follow:

Category top-1 top-5 top-10

```
game: 0.0 0.333 0.333  
position: 0.333 0.667 1.0
```