COMS 4721 Homework 5
Markov Chains & Matrix Factorization

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1 Problem 1

Figure 1 shows the best 20 teams for each set of iterations.

10	100	200	500	1000
UW-Whitewater	UW-Whitewater	OhioState	OhioState	OhioState
MountUnion	OhioState	Oregon	Oregon	Oregon
ColoradoSt-Pueblo	Oregon	Alabama	Alabama	Alabama
OhioState	Alabama	TCU	TCU	TCU
Linfield	TCU	FloridaSt	FloridaSt	FloridaSt
MinnSt-Mankato	MountUnion	UW-Whitewater	MichiganSt	MichiganSt
Wartburg	FloridaSt	MichiganSt	Baylor	Baylor
Wesley	MichiganSt	Baylor	GeorgiaTech	GeorgiaTech
NorthDakotaSt	ColoradoSt-Pueblo	GeorgiaTech	UCLA	UCLA
SouthernOregon	SouthernOregon	UCLA	Mississippi	Mississippi
Oregon	Baylor	Mississippi	Georgia	Georgia
Alabama	GeorgiaTech	Georgia	Arizona	Arizona
TCU	Wartburg	Arizona	ArizonaSt	ArizonaSt
MaryHardin-Baylor	UCLA	ArizonaSt	MississippiSt	MississippiSt
FloridaSt	Mississippi	MississippiSt	Missouri	Missouri
Hobart	CarrollMT	Missouri	Clemson	Clemson
JohnCarroll	Georgia	Clemson	SouthernCal	SouthernCal
MarianIN	Arizona	Wisconsin	Wisconsin	Wisconsin
Widener	NorthDakotaSt	SouthernCal	Auburn	Auburn
Concord	ArizonaSt	Auburn	Utah	Utah

Figure 1: Top 20 Teams for Various iterations

Figure 2 shows the value for W Infinity over 1000 iterations. The value of W Infinity after 1000 iterations is **0.0104**.
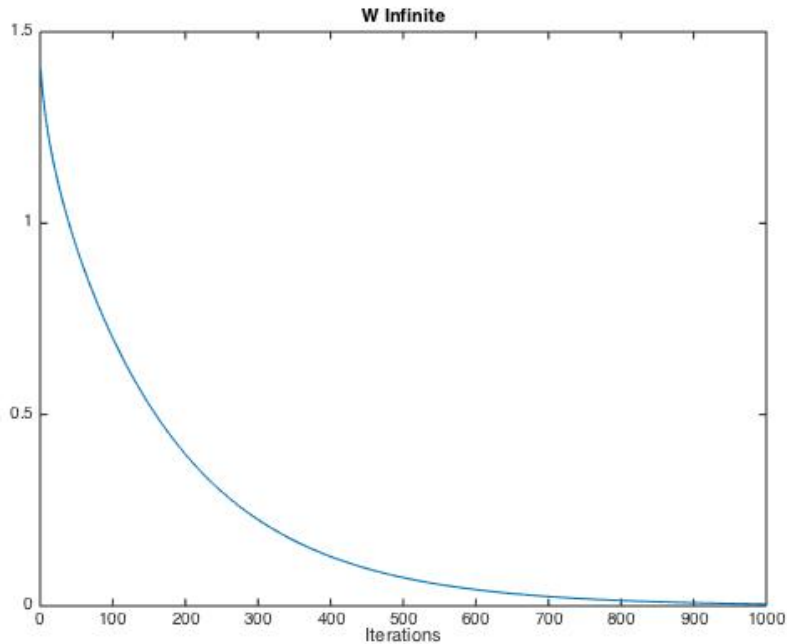
Figure 2: W Infinity over 1000 Iterations

2 Problem 2

2.1 Part 1

Figure 3 shows the Objective Function using the Euclidean Penalty over 200 iterations. Shown in Figure 4 are three examples of faces and their closest match in the W vector. The three faces used were 500, 125, and 975.

2.2 Part 2

Figure 5 shows the Divergence Penalty over 200 iterations.
Figure 6 shows 5 different sets of words that belong to different topics.
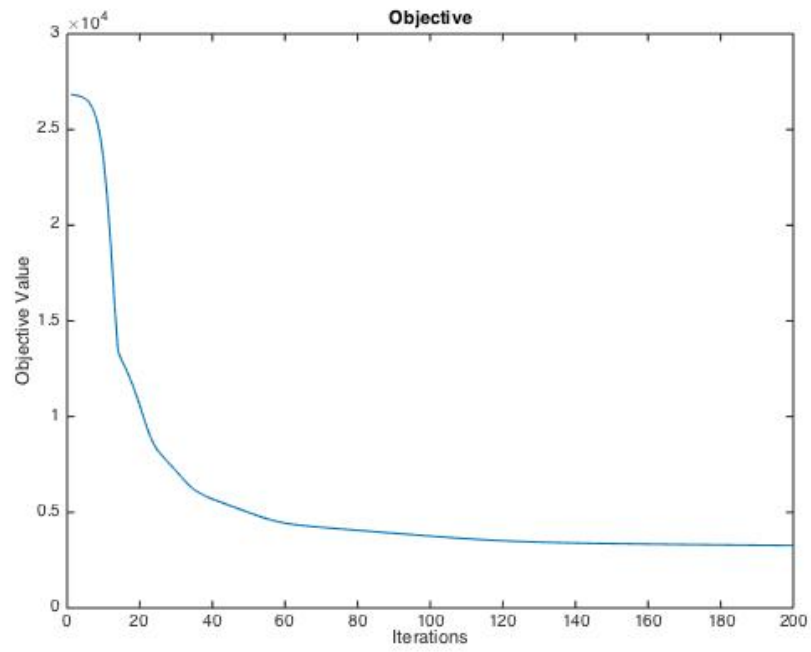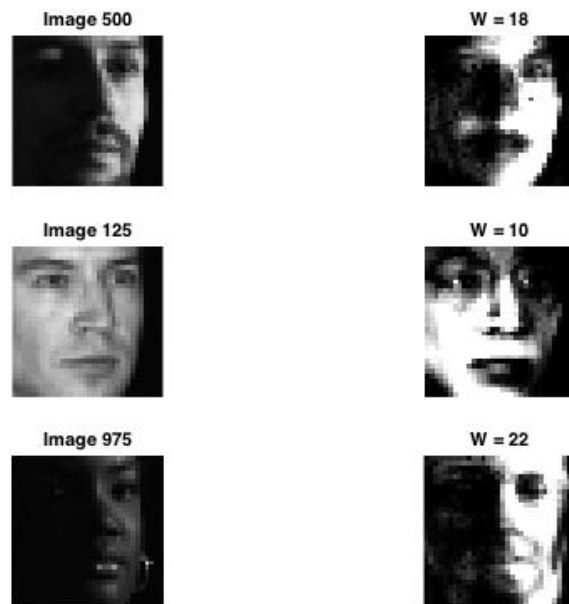
Figure 3: Objective Function of Euclidean Penalty

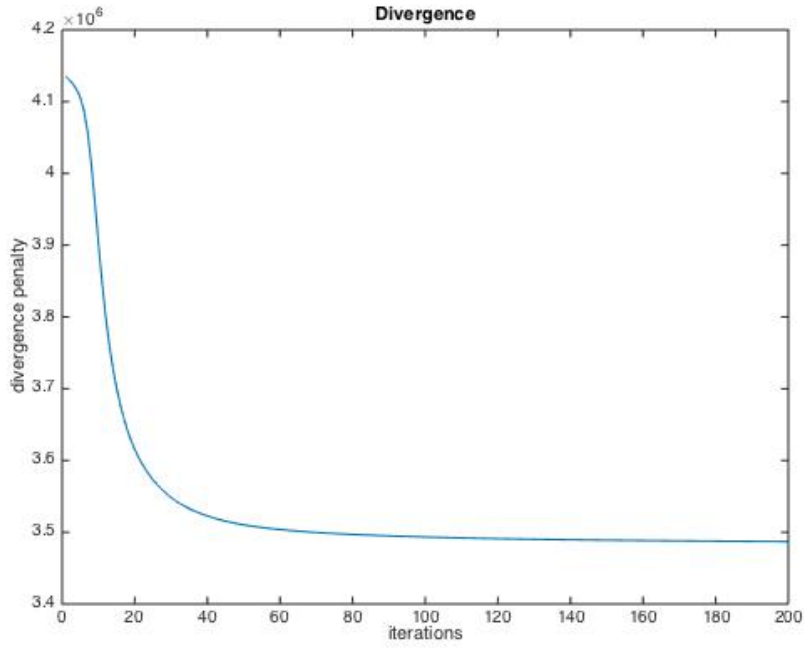Figure 4: Three Faces and their Highest W Value

Figure 5: Objective Function of Divergence Penalty

tenant	shareholder	soldier	inning	activist
acre	merger	bombing	tournament	communist
homeless	subsidiary	fighting	streak	religious
residential	transaction	fighter	runner	religion
borough	asset	commander	champion	democracy
rent	acquisition	helicopter	eight	christian
resident	bankruptcy	bomb	foul	jews
building	accounting	refugee	victory	freedom
parking	takeover	army	ninth	independence
roof	banking	raid	eighth	gay

Figure 6: Five Sets of Topics from NYT Articles