

CHAPTER 8

PERFORMANCE COMPARISON OF MDC, MFSC AND FLC

8.1 INTRODUCTION

This chapter provides the detailed analysis on the performance of MDC, MFSC and FLC based on the commonly used performance measures viz. 1. Precision 2. Recall 3. F-Measure 4. Accuracy. The variety of assessment methods and datasets used make it complex to objectively compare the effectiveness of different classification approaches (Rudy Prabowo and Mike Thelwall, 2009). Hence, only the classifiers discussed in this thesis are considered for comparison among them, as the same dataset has been used to evaluate their performance.

Precision (P) refers to the number of correctly classified positive documents divided by the total number of documents that are classified as positive. Recall (R) refers to the number of correctly classified positive documents divided by the total number of actual positive documents in the test set. F-Measure is the harmonic mean of P and R. It is generally accepted that, the F-Measure is a better performance measure than precision and recall. Accuracy refers to the number of correctly classified documents ($TP + TN$) divided by the total number of test documents ($TP + TN + FP + FN$). The classification performance of MDC, MFDC and FLC are discussed in the subsequent chapters. Precision, recall, F-Measure and accuracy have been

calculated for all the classifiers with respect to the data set containing camera reviews, cell phone reviews and movie reviews.

8.2 COMPARISON OF PERFORMANCE (FOR CAMERA AND CELL PHONE REVIEWS)

Figures 8.1 to 8.4 show the comparative performance in terms of precision, recall, F-Measure and accuracy respectively of MDC, MFSC and FLC for camera and cell phone reviews. In the Figure 8.1, FLC exhibits a consistently higher precision for both camera and cell phone reviews compared to MDC and MFSC. The higher precision of FLC is due to its capacity to correctly classify the negative documents and hence a smaller *false positive* (FP =18 for camera; FP = 19 for cell phone) compared to MDC (FP =48 for camera; FP = 52 for cell phone) and MFSC (FP =51 for camera; FP = 47 for cell phone).

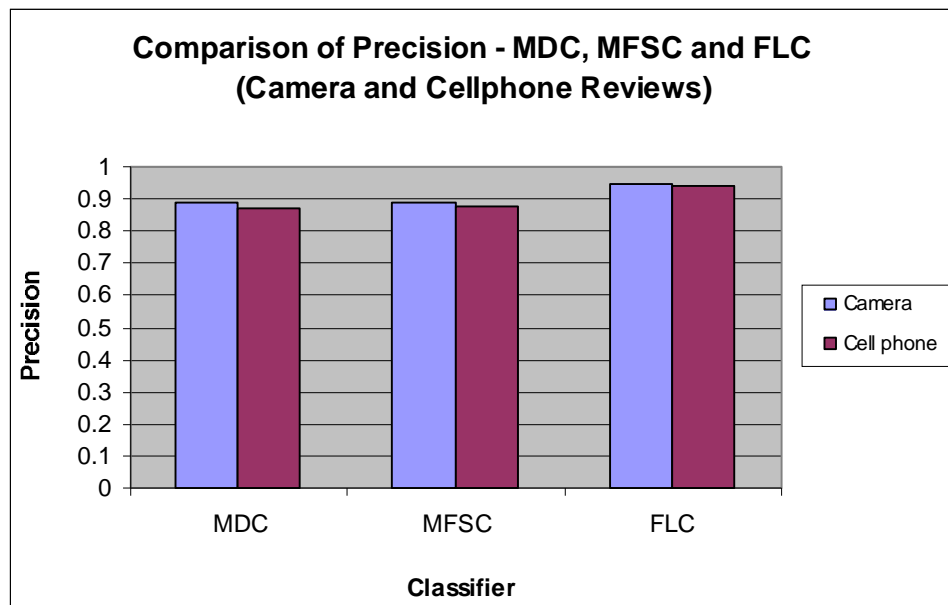


Figure 8.1 Comparison of Precision – MDC, MFSC and FLC (Camera and Cell phone reviews)

Figure 8.2 shows the recall performance of MDC, MFSC and FLC for camera and cell phone reviews. Among the three classifiers compared, the recall of FLC is inferior to that of MDC and MFSC. The ability of the MDC (FN = 30 for camera; FN = 62 for cell phone) and MFSC (FN = 17 for camera; FN = 71 for cell phone) to correctly classify the positive documents results in smaller *false negative* compared to FLC (FN = 94 for camera; FN = 109 for cell phone).

Figure 8.3 shows the F-measure of the three classifiers. For camera reviews, the F-Measure of MFSC is the maximum (0.92) followed by MDC (0.908) and FLC (0.85). For the cell phone reviews, the F-Measure of MDC is the maximum (0.86) followed by MFSC (0.85) and FLC (0.827).

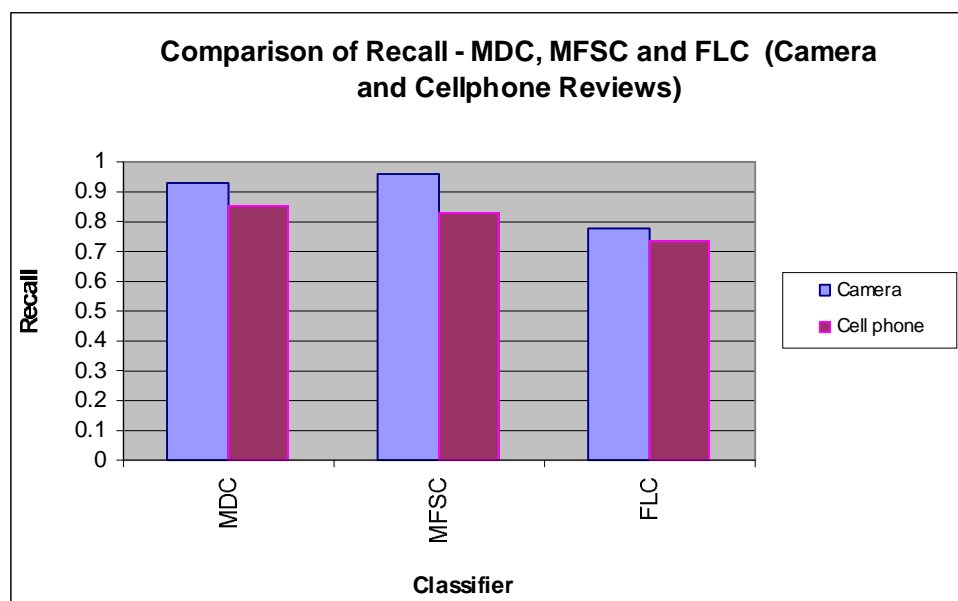


Figure 8.2 Comparison of Recall – MDC, MFSC and FLC (Camera and Cell phone reviews)

Figure 8.4 show the classification accuracy (A) of MDC, MFSC and FLC for camera and cell phone reviews. For camera reviews, the accuracy of MFSC is the maximum (87.36%) followed by MDC (85.5%) and FLC (79.18%). For the cell phone reviews, the accuracy of MDC (78.81%)

and accuracy of MFSC (78.06%) are almost equal followed by FLC (76.21%).

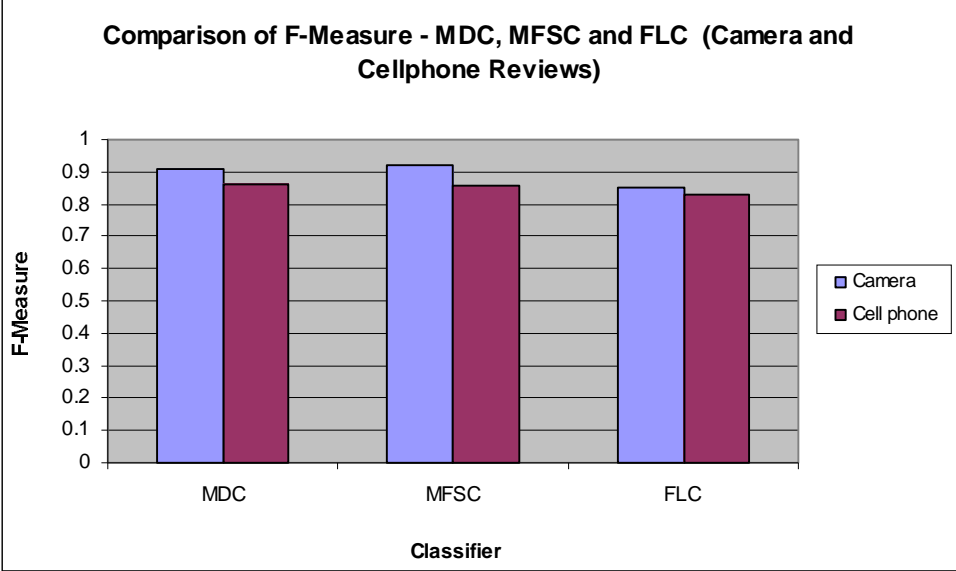


Figure 8.3 Comparison of F-Measure – MDC, MFSC and FLC (Camera and Cell phone reviews)

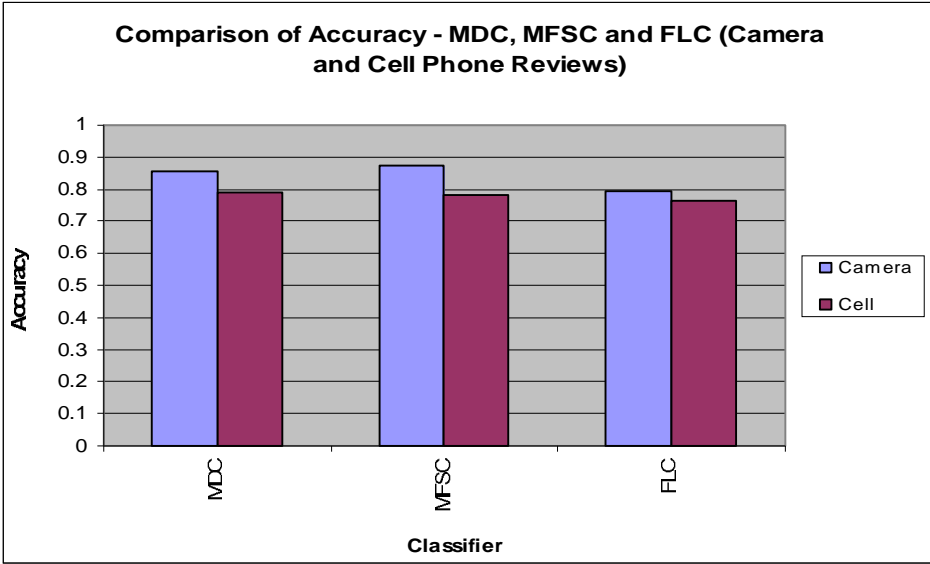


Figure 8.4 Comparison of Accuracy – MDC, MFSC and FLC (Camera and Cell phone reviews)

8.3 COMPARISON OF PERFORMANCE (FOR MOVIE REVIEWS - LDS)

Figure 8.5 shows the precision of MDC, MFSC and FLC for the movie review dataset. The subsets of size varying from 403 reviews to 25000 reviews have been considered for the performance comparison. The performance of these classifiers with respect to the increase in size has been studied. FLC performs with higher precision compared with MDC and MFSC for all the subsets of LDS. The higher precision of FLC is due to its capacity to correctly classify the negative documents and hence a smaller *false positive* (FP =19 for LDS403; FP = 164 for LDS2000; FP = 955 for LDS11000; FP = 2082 for LDS 25000) compared to MDC (FP =23 for LDS403; FP = 251 for LDS2000; FP = 1502 for LDS11000; FP = 3370 for LDS 25000) and MFSC (FP =45 for LDS403; FP = 254 for LDS2000; FP = 1521 for LDS11000; FP = 3503 for LDS 25000).

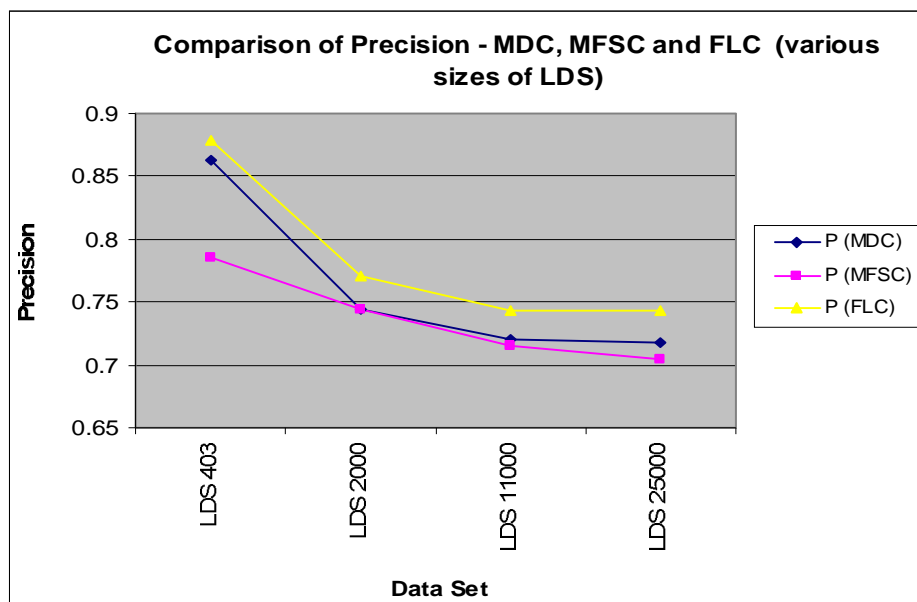


Figure 8.5 Comparison of Precision – MDC, MFSC and FLC (for the subsets of LDS)

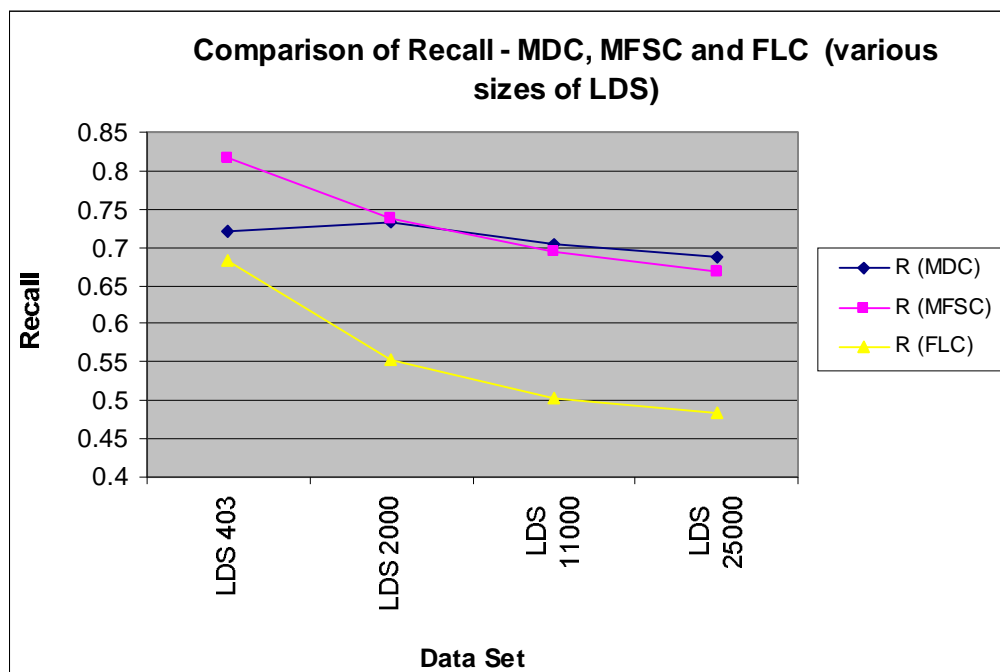


Figure 8.6 Comparison of Recall – MDC, MFSC and FLC (for the subsets of LDS)

Figure 8.6 shows the recall performance of MDC, MFSC and FLC for movie reviews. Among the three classifiers compared, the recall of FLC is inferior to that of MDC and MFSC. The ability of the MFSC (FN = 37 for LDS403; FN = 262 for LDS2000; FN = 1682 for LDS11000; FN = 4141 for LDS25000) and MDC (FN = 56 for LDS403; FN = 268 for LDS2000; FN = 1633 for LDS11000; FN = 3911 for LDS25000) to correctly classify the positive documents results in smaller *false negative* compared to FLC (FN = 64 for LDS403; FN = 448 for LDS2000; FN = 2736 for LDS11000; FN = 6462 for LDS25000).

Except for LDS403, the recall of MDC and MFSC are almost equal but the recall of FLC is less for the sizes and it rapidly decreases with respect to the increase in size of the dataset.

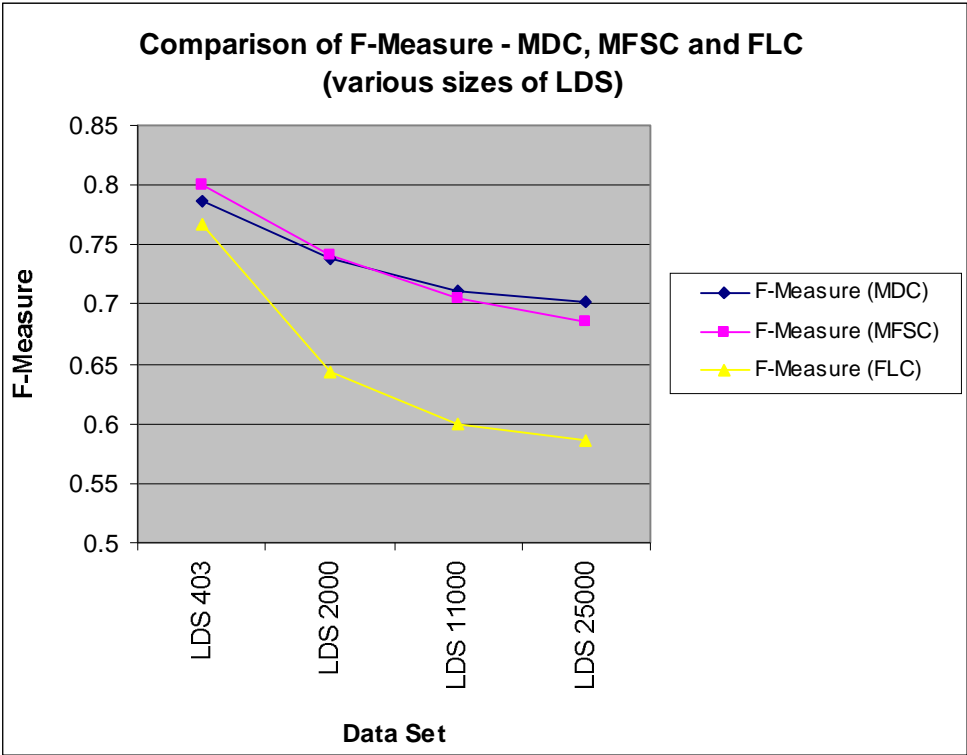


Figure 8.7 Comparison of F-Measure – MDC, MFSC and FLC (for the subsets of LDS)

Figure 8.7 shows the F-Measure comparison of the three classifiers for the movie reviews. The F- Measure of MDC and MFSC is almost equal for all the sizes of LDS, whereas the F-Measure of FLC rapidly decreases with respect to the increase in size of the dataset.

Figure 8.8 shows the classification accuracy of MDC, MFSC and FLC for the movie reviews. The classification accuracy of all the three classifiers are almost equal for LDS403. However the accuracy of FLC decreases as the size of dataset increases. The MDC and MFSC have almost equal accuracy over all the sizes of dataset. The accuracy stabilizes near 0.7

for LDS11000 to LDS25000. But the accuracy of FLC keeps decreasing as the size of the dataset increases.

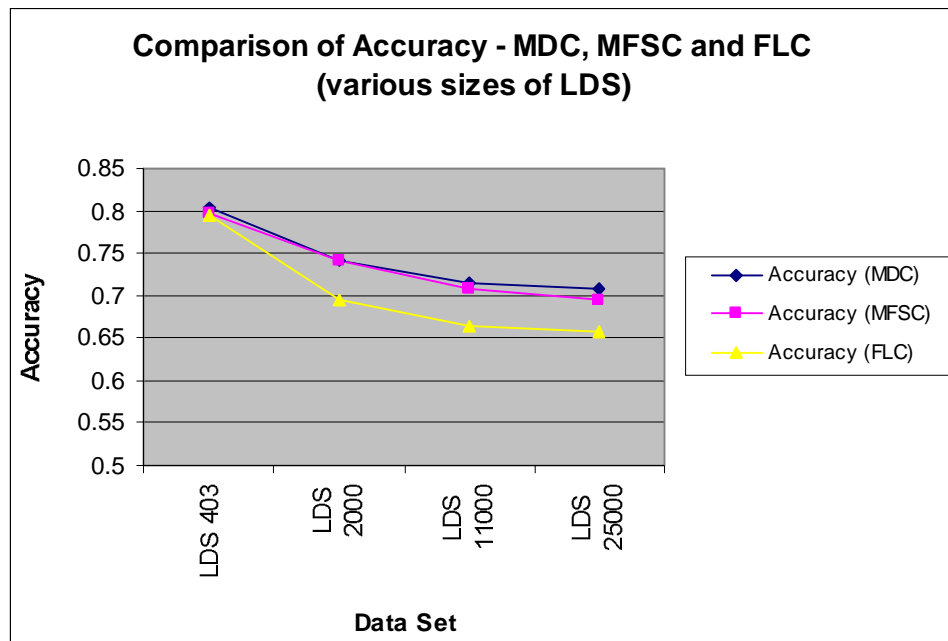


Figure 8.8 Comparison of Accuracy – MDC, MFSC and FLC (for the subsets of LDS)