Sia Ham, 17308123

Tuesday, April 16

R. Vincent, instructor

Assignment 4

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| --- | --- | --- | --- | --- | --- | --- |
| KNN | TPR | FPR | TN | FN | FP | TP |
| k = 1 | 0.764575236 | 0.155055377 | 2365 | 424 | 434 | 1377 |
| k = 2 | 0.765399036 | 0.139407245 | 2352 | 438 | 381 | 1429 |
| k = 3 | 0.746681416 | 0.161174785 | 2342 | 458 | 450 | 1350 |
| k = 4 | 0.763736264 | 0.133453237 | 2409 | 430 | 371 | 1390 |
| k = 5 | 0.726425439 | 0.154538905 | 2347 | 499 | 429 | 1325 |
| k = 10 | 0.709694989 | 0.150144718 | 2349 | 533 | 415 | 1303 |
| k = 15 | 0.682792743 | 0.167206041 | 2316 | 577 | 465 | 1242 |
| k = 20 | 0.70636663 | 0.165586753 | 2318 | 535 | 460 | 1287 |

According to the results obtained using KNN classifier, the maximum TPR is obtained when K = 2 and the minimum FPR is obtained when k = 3. In general, the increase of K value leads to the decrease of TPR and increase of FPR, implying that the sensitivity decreases and specificity increases as K value increase. Comparing to extra trees classifier, the overall speed using KNN classifier is slower than the one using extra trees classifier.

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| **Extra trees (K = 10, Nmin = 2)** | | | | | | |
| M | TPR | FPR | TN | FN | FP | TP |
| 13 | 0.987096774 | 0.066423358 | 2558 | 24 | 182 | 1836 |
| 14 | 0.982545045 | 0.061614731 | 2650 | 31 | 174 | 1745 |
| 15 | 0.983428571 | 0.066315789 | 2661 | 29 | 189 | 1721 |
| 16 | 0.986827662 | 0.05687545 | 2620 | 24 | 158 | 1798 |
| 17 | 0.986118823 | 0.064665952 | 2618 | 25 | 181 | 1776 |
| 20 | 0.987912088 | 0.052158273 | 2635 | 22 | 145 | 1798 |

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| **Extra trees (M = 15, Nmin = 2)** | | | | | | |
| K | TPR | FPR | TN | FN | FP | TP |
| 8 | 0.988795518 | 0.057193606 | 2654 | 20 | 161 | 1765 |
| 9 | 0.983225108 | 0.061409884 | 2583 | 31 | 169 | 1817 |
| 10 | 0.984916201 | 0.058718861 | 2645 | 27 | 165 | 1763 |
| 11 | 0.98579235 | 0.063176895 | 2595 | 26 | 175 | 1804 |
| 15 | 0.991740088 | 0.068247126 | 2594 | 15 | 190 | 1801 |
| 20 | 0.985024958 | 0.062924562 | 2621 | 27 | 176 | 1776 |

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| **Extra trees (M = 15, K = 10)** | | | | | | |
| Nmin | TPR | FPR | TN | FN | FP | TP |
| 1 | 0.987334802 | 0.054956897 | 2631 | 23 | 153 | 1793 |
| 2 | 0.98952591 | 0.073223259 | 2582 | 19 | 204 | 1795 |
| 3 | 0.990206746 | 0.069514844 | 2570 | 18 | 192 | 1820 |
| 4 | 0.986263736 | 0.078417266 | 2562 | 25 | 218 | 1795 |
| 5 | 0.992717087 | 0.08348135 | 2580 | 13 | 235 | 1772 |
| 10 | 0.97689769 | 0.0891445 | 2534 | 42 | 248 | 1776 |
| 15 | 0.965986395 | 0.094146685 | 2569 | 60 | 267 | 1704 |

Compared to KNN classifier, the change of the value of k does not provide a big difference in TPR and FPR. Increase of M does not bring any significant change as well. The increase of Nmin leads to the overall slight decreases of TPR and FPR whereas, but it is still not that significant.