

Mohammed Samiul Saeef

#1001387435

### **dtree pendigits\_training pendigits\_test optimized 50**

tree= 0, node= 1, feature=15, thr= 21.57, gain=0.621424  
tree= 0, node= 2, feature= 4, thr= 41.18, gain=0.587628  
tree= 0, node= 3, feature=13, thr= 58.82, gain=0.697235  
tree= 0, node= 4, feature= 9, thr= 15.69, gain=0.670083  
tree= 0, node= 5, feature=10, thr= 39.22, gain=0.629044  
tree= 0, node= 6, feature= 0, thr= 35.29, gain=0.712500  
tree= 0, node= 7, feature= 8, thr= 56.86, gain=0.814218  
tree= 0, node= 8, feature=14, thr= 60.78, gain=0.475710  
tree= 0, node= 9, feature= 5, thr= 64.71, gain=0.620325  
tree= 0, node= 10, feature=14, thr= 37.25, gain=0.224713  
tree= 0, node= 11, feature= 3, thr= 90.20, gain=0.686759  
tree= 0, node= 12, feature=14, thr= 37.25, gain=0.281171  
tree= 0, node= 13, feature=10, thr= 29.41, gain=0.584898  
tree= 0, node= 14, feature=14, thr= 96.08, gain=0.737506  
tree= 0, node= 15, feature= 7, thr= 24.33, gain=0.205385  
tree= 0, node= 16, feature= 1, thr= 73.53, gain=0.027989  
tree= 0, node= 17, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 18, feature=15, thr= 0.41, gain=0.188928  
tree= 0, node= 19, feature= 9, thr= 60.47, gain=0.530651  
tree= 0, node= 20, feature=12, thr= 30.06, gain=0.640257  
tree= 0, node= 21, feature= 8, thr= 34.59, gain=0.140904  
tree= 0, node= 22, feature= 6, thr= 72.55, gain=0.509615  
tree= 0, node= 23, feature= 7, thr= 77.10, gain=0.409412

tree= 0, node= 24, feature= 1, thr= 84.51, gain=0.550957  
tree= 0, node= 25, feature=13, thr= 14.78, gain=0.131381  
tree= 0, node= 26, feature=15, thr= 31.18, gain=0.222560  
tree= 0, node= 27, feature= 9, thr= 19.61, gain=0.464511  
tree= 0, node= 28, feature=11, thr= 31.67, gain=0.157508  
tree= 0, node= 29, feature=13, thr= 71.06, gain=0.344859  
tree= 0, node= 30, feature= 2, thr= 54.90, gain=0.092930  
tree= 0, node= 31, feature= 9, thr= 58.82, gain=0.918296  
tree= 0, node= 32, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 33, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 36, feature= 7, thr= 66.47, gain=0.110097  
tree= 0, node= 37, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 38, feature=14, thr= 25.49, gain=0.773333  
tree= 0, node= 39, feature= 0, thr= 39.22, gain=0.203813  
tree= 0, node= 40, feature= 3, thr= 96.71, gain=0.374672  
tree= 0, node= 41, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 42, feature= 9, thr= 1.43, gain=0.077936  
tree= 0, node= 43, feature= 6, thr= 68.14, gain=0.274080  
tree= 0, node= 44, feature=14, thr= 96.08, gain=0.341335  
tree= 0, node= 45, feature= 1, thr= 82.35, gain=0.324193  
tree= 0, node= 46, feature= 2, thr= 88.59, gain=0.253482  
tree= 0, node= 47, feature= 5, thr= 89.29, gain=0.811518  
tree= 0, node= 48, feature= 8, thr= 76.47, gain=0.650022  
tree= 0, node= 49, feature= 6, thr= 50.47, gain=0.757526  
tree= 0, node= 50, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 51, feature= 3, thr= 87.45, gain=0.051386  
tree= 0, node= 52, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 53, feature= 0, thr= 53.57, gain=0.129949  
tree= 0, node= 54, feature=15, thr= 67.29, gain=0.265884

tree= 0, node= 55, feature=10, thr= 67.06, gain=0.773029  
tree= 0, node= 56, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 57, feature=12, thr= 21.57, gain=0.159034  
tree= 0, node= 58, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 59, feature= 5, thr= 54.41, gain=0.006884  
tree= 0, node= 60, feature= 6, thr= 96.08, gain=0.024998  
tree= 0, node= 61, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 62, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 63, feature= 1, thr= 3.92, gain=0.998846  
tree= 0, node= 72, feature= 5, thr= 13.35, gain=0.035341  
tree= 0, node= 73, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 76, feature= 7, thr= 71.86, gain=0.496889  
tree= 0, node= 77, feature=10, thr= 60.78, gain=0.864204  
tree= 0, node= 78, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 79, feature= 1, thr= 92.47, gain=0.078528  
tree= 0, node= 80, feature= 5, thr= 68.63, gain=0.135036  
tree= 0, node= 81, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 84, feature= 8, thr= 18.67, gain=0.368566  
tree= 0, node= 85, feature= 7, thr= 73.02, gain=0.050120  
tree= 0, node= 86, feature=12, thr= 55.47, gain=0.287642  
tree= 0, node= 87, feature= 8, thr= 49.82, gain=0.208356  
tree= 0, node= 88, feature= 1, thr= 39.18, gain=0.308576  
tree= 0, node= 89, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 90, feature= 5, thr= 15.69, gain=0.106446  
tree= 0, node= 91, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 92, feature= 0, thr= 78.43, gain=0.174910  
tree= 0, node= 93, feature= 5, thr= 84.31, gain=0.901825  
tree= 0, node= 94, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 95, feature= 6, thr= 70.59, gain=0.988057

tree= 0, node= 96, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 97, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 98, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 99, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=102, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=103, feature= 8, thr= 1.96, gain=0.027154  
tree= 0, node=106, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=107, feature=14, thr= 1.96, gain=0.057144  
tree= 0, node=108, feature= 4, thr= 62.75, gain=0.149994  
tree= 0, node=109, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=110, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=111, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=114, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=115, feature= 1, thr= 26.47, gain=0.028970  
tree= 0, node=118, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=119, feature= 6, thr= 45.33, gain=0.097300  
tree= 0, node=120, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=121, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=126, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=127, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=144, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=145, feature=13, thr= 6.08, gain=0.024501  
tree= 0, node=152, feature=13, thr= 5.10, gain=0.465185  
tree= 0, node=153, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=154, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=155, feature= 7, thr= 54.53, gain=0.349184  
tree= 0, node=158, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=159, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=160, feature=-1, thr= -1.00, gain=-1.000000

tree= 0, node=161, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=168, feature= 5, thr= 74.55, gain=0.060896  
tree= 0, node=169, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=170, feature= 9, thr= 5.61, gain=0.007149  
tree= 0, node=171, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=172, feature= 6, thr= 58.29, gain=0.175730  
tree= 0, node=173, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=174, feature= 0, thr= 73.33, gain=0.054012  
tree= 0, node=175, feature=11, thr= 9.06, gain=0.541116  
tree= 0, node=176, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=177, feature= 7, thr= 67.06, gain=0.321696  
tree= 0, node=180, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=181, feature= 0, thr= 60.78, gain=0.098830  
tree= 0, node=184, feature= 9, thr= 18.55, gain=0.134335  
tree= 0, node=185, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=186, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=187, feature= 1, thr= 79.29, gain=0.678954  
tree= 0, node=190, feature= 4, thr= 48.04, gain=0.291818  
tree= 0, node=191, feature=11, thr= 39.69, gain=0.517478  
tree= 0, node=206, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=207, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=214, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=215, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=216, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=217, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=230, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=231, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=238, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=239, feature=-1, thr= -1.00, gain=-1.000000

tree= 0, node=290, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=291, feature= 9, thr= 88.47, gain=0.008575  
tree= 0, node=304, feature= 6, thr= 67.45, gain=0.250919  
tree= 0, node=305, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=310, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=336, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=337, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=340, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=341, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=344, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=345, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=348, feature= 1, thr= 89.59, gain=0.025926  
tree= 0, node=349, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=350, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=351, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=354, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=355, feature= 3, thr= 89.02, gain=0.028237  
tree= 0, node=362, feature= 8, thr= 24.51, gain=0.021367  
tree= 0, node=363, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=368, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=369, feature=14, thr= 52.94, gain=0.111623  
tree= 0, node=374, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=375, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=380, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=381, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=382, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=383, feature= 2, thr= 45.71, gain=0.103275  
tree= 0, node=582, feature= 7, thr= 17.69, gain=0.008314

tree= 0, node=583, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=608, feature= 1, thr= 81.37, gain=0.056120  
tree= 0, node=609, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=696, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=697, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=710, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=711, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=724, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=725, feature=15, thr= 9.12, gain=0.021405  
tree= 0, node=738, feature= 6, thr= 21.57, gain=0.053910  
tree= 0, node=739, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=766, feature= 1, thr= 66.67, gain=0.077022  
tree= 0, node=767, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1164, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1165, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1216, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1217, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1450, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1451, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1476, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1477, feature= 3, thr= 99.12, gain=0.041635  
tree= 0, node=1532, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=1533, feature= 2, thr= 41.47, gain=0.067329  
tree= 0, node=2954, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=2955, feature= 2, thr= 86.33, gain=0.018695  
tree= 0, node=3066, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3067, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5910, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5911, feature=-1, thr= -1.00, gain=-1.000000

classification accuracy=0.8382

**dtree pendigits\_training pendigits\_test randomized 50**

tree= 0, node= 1, feature=11, thr= 35.29, gain=0.466267  
tree= 0, node= 2, feature= 6, thr= 25.49, gain=0.544787  
tree= 0, node= 3, feature= 4, thr= 35.29, gain=0.579050  
tree= 0, node= 4, feature= 7, thr= 47.06, gain=0.433869  
tree= 0, node= 5, feature= 2, thr= 56.86, gain=0.057671  
tree= 0, node= 6, feature=10, thr= 47.06, gain=0.114410  
tree= 0, node= 7, feature= 4, thr= 66.12, gain=0.113125  
tree= 0, node= 8, feature=10, thr= 35.29, gain=0.176811  
tree= 0, node= 9, feature= 1, thr= 79.06, gain=0.351537  
tree= 0, node= 10, feature= 4, thr= 45.10, gain=0.303523  
tree= 0, node= 11, feature= 2, thr= 97.47, gain=0.086565  
tree= 0, node= 12, feature= 3, thr= 87.06, gain=0.741230  
tree= 0, node= 13, feature= 9, thr= 64.71, gain=0.347407  
tree= 0, node= 14, feature= 5, thr= 58.82, gain=0.686547  
tree= 0, node= 15, feature= 2, thr= 64.71, gain=0.109142  
tree= 0, node= 16, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 17, feature= 7, thr= 10.14, gain=0.096970  
tree= 0, node= 18, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 19, feature=14, thr= 1.96, gain=0.292041  
tree= 0, node= 20, feature= 6, thr= 40.51, gain=0.389196  
tree= 0, node= 21, feature= 4, thr= 77.76, gain=0.161652  
tree= 0, node= 22, feature= 5, thr= 69.41, gain=0.175666  
tree= 0, node= 23, feature= 3, thr= 99.29, gain=0.319967  
tree= 0, node= 24, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 25, feature=-1, thr= -1.00, gain=-1.000000



tree= 0, node= 26, feature= 7, thr= 15.53, gain=0.855243  
tree= 0, node= 27, feature= 6, thr= 47.06, gain=0.313986  
tree= 0, node= 28, feature= 3, thr= 45.10, gain=0.469823  
tree= 0, node= 29, feature= 5, thr= 94.37, gain=0.204257  
tree= 0, node= 30, feature=12, thr= 54.90, gain=0.348753  
tree= 0, node= 31, feature=10, thr= 44.69, gain=0.226163  
tree= 0, node= 34, feature= 6, thr= 24.02, gain=0.032709  
tree= 0, node= 35, feature= 2, thr= 44.84, gain=0.032624  
tree= 0, node= 38, feature= 9, thr= 35.02, gain=0.262018  
tree= 0, node= 39, feature= 9, thr= 30.04, gain=0.606504  
tree= 0, node= 40, feature=13, thr= 16.39, gain=0.890492  
tree= 0, node= 41, feature=13, thr= 14.65, gain=0.961635  
tree= 0, node= 42, feature= 1, thr= 89.65, gain=0.254476  
tree= 0, node= 43, feature=11, thr= 4.12, gain=0.318670  
tree= 0, node= 44, feature= 2, thr= 67.20, gain=0.059830  
tree= 0, node= 45, feature=13, thr= 21.88, gain=0.687648  
tree= 0, node= 46, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 47, feature=13, thr= 17.65, gain=0.632921  
tree= 0, node= 52, feature= 4, thr= 18.53, gain=0.051262  
tree= 0, node= 53, feature=10, thr= 97.18, gain=0.031543  
tree= 0, node= 54, feature=12, thr= 51.37, gain=0.084963  
tree= 0, node= 55, feature= 4, thr= 27.45, gain=0.053497  
tree= 0, node= 56, feature= 1, thr= 3.92, gain=0.265475  
tree= 0, node= 57, feature= 3, thr= 78.82, gain=0.313240  
tree= 0, node= 58, feature=13, thr= 41.18, gain=0.411418  
tree= 0, node= 59, feature= 4, thr= 48.35, gain=0.126247  
tree= 0, node= 60, feature= 1, thr= 76.47, gain=0.679991  
tree= 0, node= 61, feature=10, thr= 64.61, gain=0.236322  
tree= 0, node= 62, feature=-1, thr= -1.00, gain=-1.000000

tree= 0, node= 63, feature= 2, thr= 75.29, gain=0.231732  
tree= 0, node= 68, feature=13, thr= 53.00, gain=0.897464  
tree= 0, node= 69, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 70, feature=13, thr= 45.49, gain=0.246301  
tree= 0, node= 71, feature= 8, thr= 38.75, gain=0.049045  
tree= 0, node= 76, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 77, feature= 9, thr= 58.04, gain=0.187899  
tree= 0, node= 78, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 79, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 80, feature=11, thr= 2.43, gain=0.360989  
tree= 0, node= 81, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 82, feature= 7, thr= 64.00, gain=0.298927  
tree= 0, node= 83, feature= 3, thr= 85.73, gain=0.229836  
tree= 0, node= 84, feature= 3, thr= 96.94, gain=0.220096  
tree= 0, node= 85, feature= 6, thr= 73.88, gain=0.288952  
tree= 0, node= 86, feature=12, thr= 41.18, gain=0.196258  
tree= 0, node= 87, feature= 1, thr= 83.14, gain=0.202383  
tree= 0, node= 88, feature=13, thr= 25.71, gain=0.858984  
tree= 0, node= 89, feature=14, thr= 1.96, gain=0.702458  
tree= 0, node= 90, feature= 3, thr= 98.94, gain=0.231512  
tree= 0, node= 91, feature= 9, thr= 2.47, gain=0.048903  
tree= 0, node= 94, feature=13, thr= 6.33, gain=0.080889  
tree= 0, node= 95, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=104, feature= 5, thr= 36.47, gain=0.072262  
tree= 0, node=105, feature=13, thr= 54.90, gain=0.104419  
tree= 0, node=106, feature= 0, thr= 96.08, gain=0.098891  
tree= 0, node=107, feature= 9, thr= 56.47, gain=0.091328  
tree= 0, node=108, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=109, feature= 6, thr= 11.06, gain=0.128383

tree= 0, node=110, feature= 0, thr= 72.55, gain=0.505540  
tree= 0, node=111, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=112, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=113, feature= 0, thr= 21.18, gain=0.046956  
tree= 0, node=114, feature= 7, thr= 28.82, gain=0.207468  
tree= 0, node=115, feature= 4, thr= 53.02, gain=0.057449  
tree= 0, node=116, feature=13, thr= 20.39, gain=0.596310  
tree= 0, node=117, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=118, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=119, feature= 6, thr= 86.27, gain=0.998575  
tree= 0, node=120, feature= 1, thr= 1.49, gain=0.441119  
tree= 0, node=121, feature= 7, thr= 29.41, gain=0.751829  
tree= 0, node=122, feature= 7, thr= 64.71, gain=0.629249  
tree= 0, node=123, feature=15, thr= 52.94, gain=0.622061  
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tree= 0, node=127, feature= 2, thr= 87.29, gain=0.097975  
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tree= 0, node=2813, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=2888, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=2889, feature= 0, thr= 47.06, gain=0.095531  
tree= 0, node=2896, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=2897, feature=13, thr= 13.18, gain=0.022527  
tree= 0, node=2900, feature= 1, thr= 75.51, gain=0.178118  
tree= 0, node=2901, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=2904, feature=15, thr= 9.53, gain=0.014327

tree= 0, node=2905, feature= 1, thr= 82.43, gain=0.198434  
tree= 0, node=2914, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=2915, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=2936, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=2937, feature= 0, thr= 19.33, gain=0.046935  
tree= 0, node=3384, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3385, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3426, feature= 8, thr= 73.00, gain=0.043973  
tree= 0, node=3427, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3548, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3549, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3660, feature= 6, thr= 64.71, gain=0.037147  
tree= 0, node=3661, feature= 4, thr= 55.20, gain=0.017180  
tree= 0, node=3740, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3741, feature= 9, thr= 84.20, gain=0.022588  
tree= 0, node=3860, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3861, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3944, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=3945, feature= 1, thr= 61.10, gain=0.011583  
tree= 0, node=5410, feature= 6, thr= 50.24, gain=0.103566  
tree= 0, node=5411, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5412, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5413, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5414, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5415, feature= 4, thr= 65.24, gain=0.129502  
tree= 0, node=5416, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5417, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5436, feature= 9, thr= 0.59, gain=0.070375  
tree= 0, node=5437, feature=-1, thr= -1.00, gain=-1.000000

tree= 0, node=5438, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5439, feature= 4, thr= 71.35, gain=0.223302  
tree= 0, node=5592, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5593, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5622, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5623, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=5779, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5794, feature= 5, thr= 81.37, gain=0.176955  
tree= 0, node=5795, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5800, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=5808, feature= 1, thr= 71.71, gain=0.100537  
tree= 0, node=5809, feature= 7, thr= 64.31, gain=0.080257  
tree= 0, node=5810, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=5811, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=7320, feature=14, thr= 59.45, gain=0.578795  
tree= 0, node=7321, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=7322, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=7323, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=7482, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=7483, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=7890, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=7891, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=10820, feature= 9, thr= 0.41, gain=0.050423

tree= 0, node=10821, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=10830, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=10831, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=10872, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=10873, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=10879, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=11588, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=11589, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=11616, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=11617, feature= 1, thr= 94.18, gain=0.080429  
tree= 0, node=11618, feature=10, thr= 84.35, gain=0.015616  
tree= 0, node=11619, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=14640, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=14641, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=21640, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=21641, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=23234, feature= 8, thr= 78.33, gain=0.012564  
tree= 0, node=23235, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=23236, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=23237, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=46468, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=46469, feature= 4, thr= 43.04, gain=0.364299  
tree= 0, node=92938, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=92939, feature=-1, thr= -1.00, gain=-1.000000  
classification accuracy=0.6901



### **dtree pendigits\_training pendigits\_test forest3 50**

tree= 0, node= 1, feature=13, thr= 52.94, gain=0.549898  
tree= 0, node= 2, feature= 7, thr= 49.02, gain=0.481705  
tree= 0, node= 3, feature= 7, thr= 25.49, gain=0.115414  
tree= 0, node= 4, feature=10, thr= 49.02, gain=0.695378  
tree= 0, node= 5, feature= 6, thr= 70.59, gain=0.240299  
tree= 0, node= 6, feature= 7, thr= 2.45, gain=0.017274  
tree= 0, node= 7, feature=10, thr= 27.45, gain=0.364421  
tree= 0, node= 8, feature=12, thr= 47.55, gain=0.359473  
tree= 0, node= 9, feature= 5, thr= 66.47, gain=0.307803  
tree= 0, node= 10, feature=10, thr= 50.98, gain=0.609772  
tree= 0, node= 11, feature=15, thr= 22.18, gain=0.267462  
tree= 0, node= 12, feature= 1, thr= 98.80, gain=0.038606  
tree= 0, node= 13, feature= 1, thr= 82.71, gain=0.181202  
tree= 0, node= 14, feature=14, thr= 23.53, gain=0.296810  
tree= 0, node= 15, feature=11, thr= 45.10, gain=0.425403  
tree= 0, node= 16, feature= 5, thr= 73.47, gain=0.058348  
tree= 0, node= 17, feature= 6, thr= 21.57, gain=0.256076  
tree= 0, node= 18, feature=15, thr= 1.61, gain=0.796887  
tree= 0, node= 19, feature=15, thr= 28.55, gain=0.621994  
tree= 0, node= 20, feature= 1, thr= 88.35, gain=0.134745  
tree= 0, node= 21, feature= 2, thr= 52.94, gain=0.136134  
tree= 0, node= 22, feature= 5, thr= 74.71, gain=0.335503  
tree= 0, node= 23, feature= 9, thr= 40.39, gain=0.107863  
tree= 0, node= 24, feature=12, thr= 63.86, gain=0.534827  
tree= 0, node= 25, feature=11, thr= 60.78, gain=0.114734  
tree= 0, node= 26, feature=10, thr= 47.06, gain=0.265793  
tree= 0, node= 27, feature= 3, thr= 82.16, gain=0.382191

tree= 0, node= 28, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 29, feature= 1, thr= 1.96, gain=0.130163  
tree= 0, node= 30, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 31, feature= 4, thr= 61.41, gain=0.400735  
tree= 0, node= 32, feature=11, thr= 5.88, gain=0.213487  
tree= 0, node= 33, feature=12, thr= 25.80, gain=0.103751  
tree= 0, node= 34, feature= 8, thr= 4.24, gain=0.138338  
tree= 0, node= 35, feature= 7, thr= 23.06, gain=0.037022  
tree= 0, node= 36, feature= 4, thr= 2.65, gain=0.012968  
tree= 0, node= 37, feature= 5, thr= 60.18, gain=0.027425  
tree= 0, node= 38, feature= 4, thr= 52.94, gain=0.715458  
tree= 0, node= 39, feature= 2, thr= 65.35, gain=0.162934  
tree= 0, node= 40, feature= 9, thr= 51.06, gain=0.229040  
tree= 0, node= 41, feature= 4, thr= 76.47, gain=0.625615  
tree= 0, node= 42, feature= 8, thr= 98.04, gain=0.131088  
tree= 0, node= 43, feature= 7, thr= 69.61, gain=0.363713  
tree= 0, node= 44, feature=12, thr= 41.41, gain=0.138126  
tree= 0, node= 45, feature= 2, thr= 47.06, gain=0.124192  
tree= 0, node= 46, feature= 6, thr= 81.24, gain=0.059545  
tree= 0, node= 47, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 48, feature= 4, thr= 35.29, gain=0.795694  
tree= 0, node= 49, feature=11, thr= 40.96, gain=0.046309  
tree= 0, node= 50, feature=11, thr= 41.18, gain=0.064643  
tree= 0, node= 51, feature= 8, thr= 45.10, gain=0.985643  
tree= 0, node= 52, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 53, feature=15, thr= 68.59, gain=0.194249  
tree= 0, node= 54, feature= 5, thr= 44.98, gain=0.621856  
tree= 0, node= 55, feature=15, thr= 67.65, gain=0.322757  
tree= 0, node= 58, feature=-1, thr= -1.00, gain=-1.000000

tree= 0, node= 59, feature= 5, thr= 53.18, gain=0.088863  
tree= 0, node= 62, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 63, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 64, feature=11, thr= 2.06, gain=0.113433  
tree= 0, node= 65, feature= 8, thr= 70.59, gain=0.150946  
tree= 0, node= 66, feature=12, thr= 14.22, gain=0.023625  
tree= 0, node= 67, feature= 1, thr= 77.57, gain=0.588179  
tree= 0, node= 68, feature=13, thr= 10.59, gain=0.675623  
tree= 0, node= 69, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 70, feature=12, thr= 51.22, gain=0.216678  
tree= 0, node= 71, feature= 8, thr= 35.29, gain=0.365123  
tree= 0, node= 72, feature= 6, thr= 15.69, gain=0.081034  
tree= 0, node= 73, feature= 7, thr= 24.02, gain=0.242964  
tree= 0, node= 74, feature= 4, thr= 64.00, gain=0.024032  
tree= 0, node= 75, feature= 6, thr= 50.59, gain=0.360781  
tree= 0, node= 76, feature= 7, thr= 41.47, gain=0.309933  
tree= 0, node= 77, feature=14, thr= 15.69, gain=0.261923  
tree= 0, node= 78, feature=12, thr= 58.51, gain=0.234628  
tree= 0, node= 79, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 80, feature= 2, thr= 72.55, gain=0.255071  
tree= 0, node= 81, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 82, feature=13, thr= 11.29, gain=0.313865  
tree= 0, node= 83, feature= 4, thr= 96.39, gain=0.213446  
tree= 0, node= 84, feature= 2, thr= 28.55, gain=0.093742  
tree= 0, node= 85, feature=11, thr= 28.82, gain=0.667295  
tree= 0, node= 86, feature= 5, thr= 85.41, gain=0.218586  
tree= 0, node= 87, feature= 4, thr= 56.86, gain=0.101305  
tree= 0, node= 88, feature=12, thr= 25.31, gain=0.260494  
tree= 0, node= 89, feature= 0, thr= 56.86, gain=0.685482

tree= 0, node= 90, feature= 3, thr= 88.24, gain=0.807572  
tree= 0, node= 91, feature=14, thr= 1.96, gain=0.551042  
tree= 0, node= 92, feature= 3, thr= 98.04, gain=0.071270  
tree= 0, node= 93, feature=10, thr= 72.49, gain=0.050456  
tree= 0, node= 96, feature=11, thr= 85.45, gain=0.007129  
tree= 0, node= 97, feature= 9, thr= 40.24, gain=0.068315  
tree= 0, node= 98, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node= 99, feature= 4, thr= 21.57, gain=0.789712  
tree= 0, node=100, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=101, feature= 1, thr= 99.02, gain=0.043285  
tree= 0, node=102, feature= 4, thr= 79.69, gain=0.106005  
tree= 0, node=103, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=106, feature=11, thr= 78.43, gain=0.082837  
tree= 0, node=107, feature= 3, thr= 44.35, gain=0.090861  
tree= 0, node=108, feature= 2, thr= 31.37, gain=0.175522  
tree= 0, node=109, feature= 0, thr= 78.24, gain=0.103275  
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tree= 0, node=111, feature=10, thr= 62.75, gain=0.845307  
tree= 0, node=118, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=132, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=134, feature= 1, thr= 62.18, gain=0.215979  
tree= 0, node=135, feature= 4, thr= 97.10, gain=0.077957  
tree= 0, node=136, feature=-1, thr= -1.00, gain=-1.000000

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tree= 0, node=140, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=141, feature=11, thr= 25.59, gain=0.558065  
tree= 0, node=142, feature=12, thr= 55.69, gain=0.044196  
tree= 0, node=143, feature= 7, thr= 38.22, gain=0.115580  
tree= 0, node=144, feature= 0, thr= 64.71, gain=0.135493  
tree= 0, node=145, feature=14, thr= 28.12, gain=0.019160  
tree= 0, node=146, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=147, feature= 9, thr= 6.59, gain=0.139233  
tree= 0, node=148, feature= 4, thr= 8.65, gain=0.011540  
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tree= 0, node=153, feature=15, thr= 0.53, gain=0.855040  
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tree= 0, node=167, feature=13, thr= 16.59, gain=0.476353  
tree= 0, node=168, feature= 0, thr= 39.22, gain=0.358068  
tree= 0, node=169, feature=12, thr= 66.67, gain=0.184256  
tree= 0, node=170, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=171, feature=15, thr= 0.14, gain=0.078648

tree= 0, node=172, feature=15, thr= 0.75, gain=0.124952  
tree= 0, node=173, feature=15, thr= 4.31, gain=0.136149  
tree= 0, node=174, feature= 3, thr= 91.84, gain=0.120934  
tree= 0, node=175, feature= 3, thr= 88.82, gain=0.883368  
tree= 0, node=176, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=177, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=179, feature=11, thr= 69.88, gain=0.370391  
tree= 0, node=180, feature= 0, thr= 45.10, gain=0.309442  
tree= 0, node=181, feature= 8, thr= 59.06, gain=0.334896  
tree= 0, node=182, feature=15, thr= 2.16, gain=0.153911  
tree= 0, node=183, feature= 7, thr= 70.59, gain=0.366115  
tree= 0, node=184, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=185, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=186, feature= 9, thr= 25.59, gain=0.032929  
tree= 0, node=187, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=192, feature= 3, thr= 52.94, gain=0.017064  
tree= 0, node=193, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=194, feature=14, thr= 88.24, gain=0.151402  
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tree= 0, node=198, feature=13, thr= 92.35, gain=0.023452  
tree= 0, node=199, feature=10, thr= 98.35, gain=0.035455  
tree= 0, node=202, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=203, feature= 1, thr=100.00, gain=0.000000  
tree= 0, node=204, feature=11, thr= 77.47, gain=0.058376  
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tree= 0, node=212, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=213, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=214, feature= 6, thr= 54.90, gain=0.986040

tree= 0, node=215, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=216, feature= 7, thr= 5.16, gain=0.173925  
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tree= 0, node=218, feature= 6, thr= 91.06, gain=0.092259  
tree= 0, node=219, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=222, feature= 4, thr= 45.18, gain=0.064357  
tree= 0, node=223, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=238, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=239, feature= 2, thr= 1.67, gain=0.039221  
tree= 0, node=260, feature= 0, thr= 54.90, gain=0.701238  
tree= 0, node=261, feature= 0, thr= 43.14, gain=0.113274  
tree= 0, node=268, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=269, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=270, feature= 9, thr= 8.24, gain=0.180792  
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tree= 0, node=283, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=284, feature= 2, thr= 59.63, gain=0.043603  
tree= 0, node=285, feature=12, thr= 59.22, gain=0.035728  
tree= 0, node=286, feature= 8, thr= 61.10, gain=0.191995  
tree= 0, node=287, feature= 3, thr= 95.29, gain=0.095619  
tree= 0, node=288, feature= 8, thr= 75.04, gain=0.037522  
tree= 0, node=289, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=290, feature=-1, thr= -1.00, gain=-1.000000  
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tree= 0, node=294, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=295, feature=-1, thr= -1.00, gain=-1.000000  
tree= 0, node=296, feature=14, thr= 47.12, gain=0.089323  
tree= 0, node=297, feature=-1, thr= -1.00, gain=-1.000000

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