MULTICLASS GRADIENT DESCENT (WITH NEW DATASET)

Iteration 1 | Cost: 3.217520e+03

Iteration 2 | Cost: 2.193516e+03

Iteration 3 | Cost: 1.252458e+03

Iteration 4 | Cost: 9.964328e+02

Iteration 5 | Cost: 8.577712e+02

Iteration 6 | Cost: 6.639464e+02

Iteration 7 | Cost: 6.393171e+02

Iteration 8 | Cost: 5.990207e+02

Iteration 9 | Cost: 5.708818e+02

Iteration 10 | Cost: 5.358742e+02

Iteration 11 | Cost: 4.775474e+02

Iteration 12 | Cost: 4.471471e+02

Iteration 13 | Cost: 3.663275e+02

Iteration 14 | Cost: 3.117132e+02

Iteration 15 | Cost: 2.862306e+02

Iteration 16 | Cost: 2.510677e+02

Iteration 17 | Cost: 2.273818e+02

Iteration 18 | Cost: 2.075837e+02

Iteration 19 | Cost: 1.952453e+02

Iteration 20 | Cost: 1.871294e+02

Iteration 21 | Cost: 1.778803e+02

Iteration 22 | Cost: 1.554815e+02

Iteration 23 | Cost: 1.455311e+02

Iteration 24 | Cost: 1.356741e+02

Iteration 25 | Cost: 1.263141e+02

Iteration 26 | Cost: 1.132006e+02

Iteration 27 | Cost: 1.044877e+02

Iteration 28 | Cost: 9.910891e+01

Iteration 29 | Cost: 9.324794e+01

Iteration 30 | Cost: 8.154663e+01

Iteration 31 | Cost: 7.659503e+01

Iteration 32 | Cost: 7.491113e+01

Iteration 33 | Cost: 7.048098e+01

Iteration 34 | Cost: 6.883401e+01

Iteration 35 | Cost: 6.742266e+01

Iteration 36 | Cost: 6.503539e+01

Iteration 37 | Cost: 6.325183e+01

Iteration 38 | Cost: 6.227508e+01

Iteration 39 | Cost: 6.129172e+01

Iteration 40 | Cost: 5.489516e+01

Iteration 41 | Cost: 3.912095e+01

Iteration 42 | Cost: 3.308589e+01

Iteration 43 | Cost: 2.646410e+01

Iteration 44 | Cost: 1.966655e+01

Iteration 45 | Cost: 1.710998e+01

Iteration 46 | Cost: 1.453529e+01

Iteration 47 | Cost: 1.123328e+01

Iteration 48 | Cost: 1.043731e+01

Iteration 49 | Cost: 9.535734e+00

Iteration 50 | Cost: 8.732044e+00

Iteration 51 | Cost: 8.228657e+00

Iteration 52 | Cost: 7.529650e+00

Iteration 53 | Cost: 6.632030e+00

Iteration 54 | Cost: 6.164006e+00

Iteration 55 | Cost: 5.950563e+00

Iteration 56 | Cost: 5.653070e+00

Iteration 57 | Cost: 5.575025e+00

Iteration 58 | Cost: 5.514781e+00

Iteration 59 | Cost: 5.407171e+00

Iteration 60 | Cost: 5.299908e+00

Iteration 61 | Cost: 5.221410e+00

Iteration 62 | Cost: 5.180807e+00

Iteration 63 | Cost: 5.141400e+00

Iteration 64 | Cost: 4.982105e+00

Iteration 65 | Cost: 4.874560e+00

Iteration 66 | Cost: 4.836697e+00

Iteration 67 | Cost: 4.592697e+00

Iteration 68 | Cost: 4.271927e+00

Iteration 69 | Cost: 3.935535e+00

Iteration 70 | Cost: 3.636929e+00

Iteration 71 | Cost: 3.322278e+00

Iteration 72 | Cost: 3.172485e+00

Iteration 73 | Cost: 2.981502e+00

Iteration 74 | Cost: 2.653273e+00

Iteration 75 | Cost: 2.228596e+00

Iteration 76 | Cost: 2.037105e+00

Iteration 77 | Cost: 1.953300e+00

Iteration 78 | Cost: 1.889941e+00

Iteration 79 | Cost: 1.789921e+00

Iteration 80 | Cost: 1.693945e+00

Iteration 81 | Cost: 1.656026e+00

Iteration 82 | Cost: 1.608176e+00

Iteration 83 | Cost: 1.588898e+00

Iteration 84 | Cost: 1.573852e+00

Iteration 85 | Cost: 1.548959e+00

Iteration 86 | Cost: 1.501826e+00

Iteration 87 | Cost: 1.460596e+00

Iteration 88 | Cost: 1.316264e+00

Iteration 89 | Cost: 1.116385e+00

Iteration 90 | Cost: 1.107786e+00

Iteration 91 | Cost: 1.070914e+00

Iteration 92 | Cost: 1.042771e+00

Iteration 93 | Cost: 1.004850e+00

Iteration 94 | Cost: 9.474324e-01

Iteration 95 | Cost: 9.148321e-01

Iteration 96 | Cost: 8.288581e-01

Iteration 97 | Cost: 7.032899e-01

Iteration 98 | Cost: 6.472034e-01

Iteration 99 | Cost: 6.452035e-01

Iteration 100 | Cost: 5.905084e-01

Iteration 101 | Cost: 5.776438e-01

Iteration 102 | Cost: 5.652664e-01

Iteration 103 | Cost: 5.534183e-01

Iteration 104 | Cost: 5.353260e-01

Iteration 105 | Cost: 5.273665e-01

Iteration 106 | Cost: 5.194102e-01

Iteration 107 | Cost: 5.154762e-01

Iteration 108 | Cost: 5.022150e-01

Iteration 109 | Cost: 4.717189e-01

Iteration 110 | Cost: 4.256805e-01

Iteration 111 | Cost: 3.930267e-01

Iteration 112 | Cost: 3.606668e-01

Iteration 113 | Cost: 3.468825e-01

Iteration 114 | Cost: 3.346339e-01

Iteration 115 | Cost: 3.206214e-01

Iteration 116 | Cost: 3.138509e-01

Iteration 117 | Cost: 3.104830e-01

Iteration 118 | Cost: 2.967242e-01

Iteration 119 | Cost: 2.905842e-01

Iteration 120 | Cost: 2.873722e-01

Iteration 121 | Cost: 2.866097e-01

Iteration 122 | Cost: 2.814932e-01

Iteration 123 | Cost: 2.766635e-01

Iteration 124 | Cost: 2.714404e-01

Iteration 125 | Cost: 2.648566e-01

Iteration 126 | Cost: 2.576659e-01

Iteration 127 | Cost: 2.510511e-01

Iteration 128 | Cost: 2.449843e-01

Iteration 129 | Cost: 2.229454e-01

Iteration 130 | Cost: 2.136743e-01

Iteration 131 | Cost: 1.996838e-01

Iteration 132 | Cost: 1.974727e-01

Iteration 133 | Cost: 1.949051e-01

Iteration 134 | Cost: 1.922351e-01

Iteration 135 | Cost: 1.892307e-01

Iteration 136 | Cost: 1.837945e-01

Iteration 137 | Cost: 1.717969e-01

Iteration 138 | Cost: 1.372375e-01

Iteration 139 | Cost: 1.090410e-01

Iteration 140 | Cost: 7.194429e-02

Iteration 141 | Cost: 5.827577e-02

Iteration 142 | Cost: 5.428532e-02

Iteration 143 | Cost: 4.340097e-02

Iteration 144 | Cost: 4.215313e-02

Iteration 145 | Cost: 4.051345e-02

Iteration 146 | Cost: 3.938220e-02

Iteration 147 | Cost: 3.635530e-02

Iteration 148 | Cost: 3.554743e-02

Iteration 149 | Cost: 3.506010e-02

Iteration 150 | Cost: 3.400174e-02

Iteration 151 | Cost: 3.176728e-02

Iteration 152 | Cost: 2.962882e-02

Iteration 153 | Cost: 2.703015e-02

Iteration 154 | Cost: 2.485963e-02

Iteration 155 | Cost: 1.883164e-02

Iteration 156 | Cost: 1.427565e-02

Iteration 157 | Cost: 1.078644e-02

Iteration 158 | Cost: 8.943707e-03

Iteration 159 | Cost: 7.527061e-03

Iteration 160 | Cost: 6.012259e-03

Iteration 161 | Cost: 5.760092e-03

Iteration 162 | Cost: 5.538396e-03

Iteration 163 | Cost: 5.346574e-03

Iteration 164 | Cost: 5.101453e-03

Iteration 165 | Cost: 4.966042e-03

Iteration 166 | Cost: 4.913708e-03

Iteration 167 | Cost: 4.795695e-03

Iteration 168 | Cost: 4.719720e-03

Iteration 169 | Cost: 4.631031e-03

Iteration 170 | Cost: 4.475190e-03

Iteration 171 | Cost: 4.369131e-03

Iteration 172 | Cost: 4.215972e-03

Iteration 173 | Cost: 4.089845e-03

Iteration 174 | Cost: 4.024970e-03

Iteration 175 | Cost: 4.003203e-03

Iteration 176 | Cost: 3.923333e-03

Iteration 177 | Cost: 3.883806e-03

Iteration 178 | Cost: 3.844399e-03

Iteration 179 | Cost: 3.684736e-03

Iteration 180 | Cost: 3.542822e-03

Iteration 181 | Cost: 3.070622e-03

Iteration 182 | Cost: 2.566253e-03

Iteration 183 | Cost: 2.318769e-03

Iteration 184 | Cost: 2.271949e-03

Iteration 185 | Cost: 2.047121e-03

Iteration 186 | Cost: 1.968898e-03

Iteration 187 | Cost: 1.939773e-03

Iteration 188 | Cost: 1.902778e-03

Iteration 189 | Cost: 1.875148e-03

Iteration 190 | Cost: 1.799957e-03

Iteration 191 | Cost: 1.715222e-03

Iteration 192 | Cost: 1.624836e-03

Iteration 193 | Cost: 1.538333e-03

Iteration 194 | Cost: 1.448208e-03

Iteration 195 | Cost: 1.341821e-03

Iteration 196 | Cost: 1.269725e-03

Iteration 197 | Cost: 1.248911e-03

Iteration 198 | Cost: 1.189590e-03

Iteration 199 | Cost: 1.125393e-03

Iteration 200 | Cost: 1.055480e-03

Training Set Accuracy: 100.000000

Validation Set Accuracy: 79.900000

Test Set Accuracy: 85.600000

Total Processing Time: 3.222492 seconds