

# ASSESSMENT-HAPPYMONK

## Technical Report: Iris Dataset with 1 Hidden Layer ANN

Algorithm: Artificial Neural Network (ANN) with 1 Hidden Layer

Model Architecture:

Model: "sequential\_52"

Layer (type)	Output Shape	Param #
dense_153 (Dense)	(None, 20)	100
dense_154 (Dense)	(None, 10)	210
dense_155 (Dense)	(None, 3)	33

Total params: 343

Trainable params: 343

Non-trainable params: 0

Initial Settings:

Sampling the parameters k0 and k1 from some distribution: Using default initialization in Keras (uniform or normal)

Parameter Updates on Epochs:

Training the model using Adam optimizer with default settings.

Final Parameter Values at the End of Training:

[[ 0.22877988 -0.24477907 -0.4476956 -0.40416896 0.41064283 -0.17565478  
-0.05672081 0.15901771 -0.41237503 -0.2698224 -0.2215564 -0.26135296  
0.16563287 0.27942276 -0.353323 0.35175782 -0.03561552 0.37997186  
-0.2432897 0.03976624]  
[-0.09982231 -0.05105335 0.14514375 0.22553755 -0.01452021 -0.34800607  
-0.24599646 -0.19403312 -0.21626928 -0.04264795 0.0255069 -0.09029461  
-0.01566251 0.00618057 -0.09139872 -0.16174647 0.10903504 0.48034236  
-0.24936295 0.02007664]  
[ 0.20702851 0.34596625 0.1266259 -0.4736452 -0.22177638 -0.5340425  
0.2552426 0.41113532 -0.09802675 -0.16803214 -0.24641477 -0.45002538  
0.01503579 -0.03726292 0.17628038 0.01921722 0.27380762 -0.248131  
-0.2303279 -0.19733454]  
[ 0.29949206 -0.4842591 0.42352006 -0.25527734 0.28477633 -0.3389249  
-0.36560822 0.30229706 -0.24323103 0.30642 -0.43150803 -0.08468878  
0.11027204 0.00652321 0.46028984 0.12283958 0.36941782 -0.2932897  
-0.1453685 0.44558185]]  
[ 0.03561823 0.01549106 0.0365791 -0.03259493 0.03383861 -0.038099  
0.01561266 -0.03835093 -0.03436693 0.04128823 0.0107473 -0.0289579  
-0.04002987 0.03154865 -0.03541099 -0.03920237 -0.03961047 0.03123329  
0.03435951 0.02521161]  
[[-0.14919636 0.08077055 0.15808481 -0.09433382 -0.31957963 0.37852362

-0.0963396 -0.21099415 -0.2953453 0.18206261]  
 [-0.07891044 -0.00100073 -0.20556262 -0.08310045 -0.34107077 0.42690042  
 0.02982247 0.27215576 -0.40825012 0.04372152]  
 [0.37529746 0.04626299 0.24507332 -0.23553221 -0.21312597 -0.01665404  
 -0.36141562 0.17461549 0.3690125 -0.08553697]  
 [-0.15463811 0.01230544 0.03137132 -0.12682246 0.17349452 0.2536778  
 0.4788787 0.12779401 -0.12583846 -0.1507787 ]  
 [0.23408696 -0.06298457 -0.358635 0.1817823 0.12536243 -0.17569412  
 -0.16555768 -0.2693004 -0.4145889 -0.0677705 ]  
 [0.05748376 -0.47949386 0.14712803 -0.32756078 0.01393567 -0.34506834  
 -0.15549538 -0.1474645 -0.0042533 -0.19679797]  
 [0.24234691 -0.21250741 -0.4473594 -0.15740342 -0.39705184 -0.05194032  
 0.1310816 -0.00466779 -0.3940012 0.01334966]  
 [0.03363175 -0.25600657 -0.2548475 -0.412805 0.31763104 0.22791061  
 -0.25781718 -0.11130787 -0.39146197 -0.23686592]  
 [-0.17028272 0.25527984 0.1518597 -0.37665445 0.14574187 -0.3151052  
 0.4068942 0.13785969 -0.04093396 -0.09556197]  
 [-0.13686934 -0.35303107 0.3343552 0.343561 0.24618843 0.10464035  
 -0.30442974 -0.08939581 -0.32754788 -0.03828465]  
 [0.15462601 -0.02559846 0.03013308 -0.02845583 0.11043581 -0.12445847  
 -0.3324252 0.4284384 0.18401018 -0.20670716]  
 [0.2604936 0.26897717 0.03508606 -0.290989 0.287581 0.2670796  
 -0.09263811 0.01009127 0.25854474 0.19002251]  
 [0.3210479 -0.25400066 0.05268551 -0.22050665 -0.22685665 0.31401515  
 0.05529423 0.4164073 -0.37688696 -0.05206074]  
 [0.11104778 0.02900007 0.4748075 0.30701962 -0.16182955 -0.430686  
 0.0859132 0.1298473 -0.3193917 -0.20570381]  
 [0.1924938 -0.40489754 0.3758319 0.08378573 -0.05318045 0.2628859  
 0.11483581 -0.05303157 0.2906971 -0.14199622]  
 [0.12312277 -0.29854757 -0.28592503 -0.33161473 -0.16486654 0.41774485  
 0.28058416 -0.33496755 -0.09121167 0.46409914]  
 [-0.04210128 -0.35901946 0.06883282 -0.35413092 0.15225986 -0.09743438  
 0.10489943 0.4237813 -0.16280068 -0.03188035]  
 [-0.01310963 0.05618518 -0.40430337 -0.23969823 -0.3038361 0.06437103  
 -0.12859593 0.3970318 0.17983942 0.18716183]  
 [0.29295114 0.03963557 0.24278629 0.30683663 0.4196622 -0.4153303  
 -0.10478379 0.40589797 0.28079766 -0.27763194]  
 [0.4061542 0.11124243 -0.14179961 -0.37622488 -0.43049777 -0.24298868  
 0.07036998 -0.43326798 0.26470748 0.04769096]]  
 [3.4118298e-02 3.6464550e-02 3.7387736e-02 3.5845872e-02  
 -2.9615112e-02 -2.6682263e-02 -3.4425136e-02 -8.0130703e-05  
 3.0979998e-02 2.5665738e-02]  
 [[-0.2645119 -0.6003806 0.32488996] [0.5570394 -0.20889215 -0.01345813] [0.4571948 -  
 0.2993078 -0.10410137] [0.61031836 -0.47216627 -0.25988927] [-0.5982518 0.43604523  
 0.1713744 ] [0.49871916 0.6404602 -0.53434825] [-0.51793367 0.18257879 -0.42935476] [-  
 0.35456738 0.01261609 0.54000324] [0.6427879 0.30607703 -0.38752013] [-0.03227406 -  
 0.01144207 0.44945425]] [0.03342079 -0.03239796 0.02729744]

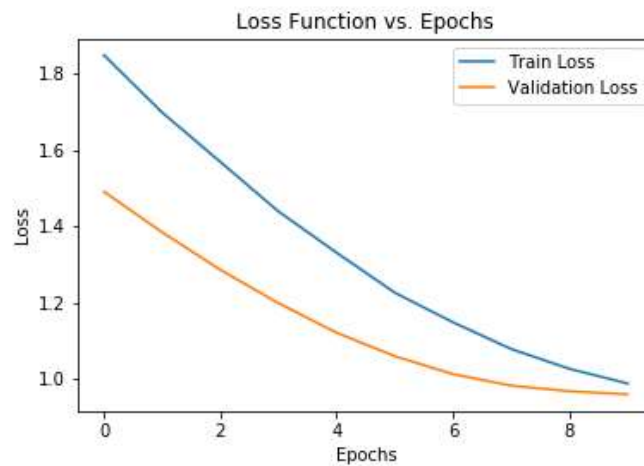
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 Train Loss: 0.9874

Test Loss: 0.9744

Train Accuracy: 0.4722

Test Accuracy: 0.6333  
F1-Score (Weighted): 0.5195

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## Technical Report: Bank Dataset with 1 Hidden Layer ANN

Algorithm: Artificial Neural Network (ANN) with 1 Hidden Layer

Model Architecture:

Model: "sequential\_27"

Layer (type)	Output Shape	Param #
dense_81 (Dense)	(None, 20)	100
dense_82 (Dense)	(None, 10)	210
dense_83 (Dense)	(None, 1)	11

Total params: 321

Trainable params: 321

Non-trainable params: 0

Initial Settings:

Sampling the parameters k0 and k1 from some distribution: Using default initialization in Keras (uniform or normal)

Parameter Updates on Epochs:

Training the model using Adam optimizer with default settings.

Final Parameter Values at the End of Training:

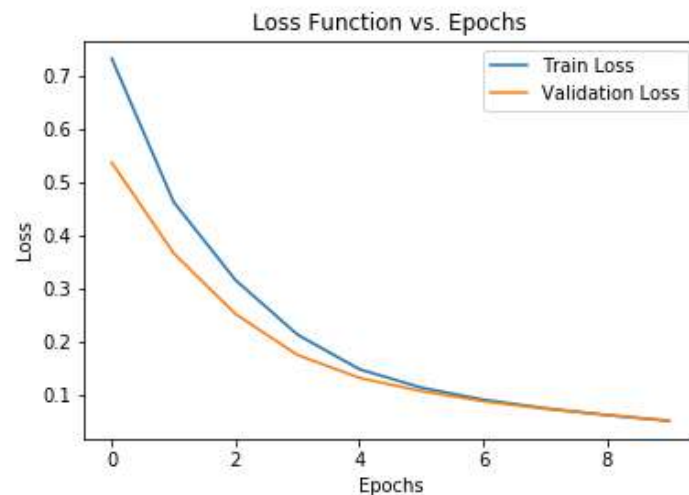
```
[[ -0.51773316  0.6244451  0.11448912  0.24637952 -0.01955289 -0.09110846
   0.2530899  -0.09012175  0.12382434  0.52572155  0.27037182  0.33547187
  -0.5684925  -0.43202034 -0.4188841  0.21620588 -0.38477337 -0.23190068
   0.01410242 -0.25190878]
[ -0.18486214  0.5737049 -0.41848326  0.12074432  0.43576646  0.04780756
  -0.12283461 -0.3023215  0.2790243  0.34828654  0.22402918  0.10941167
  -0.15064757  0.1054742  0.37898624 -0.07822306 -0.18880537  0.40545133
   0.0890643  -0.420392 ]
```

[-0.2425333 0.6260514 0.4756726 0.1753912 -0.16966528 -0.09606729  
0.16696216 0.46023238 0.3011052 -0.32328406 0.4494468 0.08064661  
0.26222074 0.29446417 -0.0044978 0.14858854 -0.05737142 -0.5171919  
-0.0125171 -0.35602748]  
[-0.25645116 -0.39389881 -0.45004377 0.39842245 -0.55506617 0.2953838  
0.11046414 0.36378446 -0.02979089 -0.1873034 -0.20122878 0.32625607  
-0.1135086 0.41618758 0.09936774 0.15398516 -0.18619317 0.00752143  
0.54825956 0.41452622]]  
[0.22402513 0.11816254 0.0036545 -0.06730835 0.05242733 -0.02698656  
-0.10262883 -0.00643436 0.05709653 -0.05179887 0.10993534 0.0395832  
0.14163822 0.01722109 -0.0822392 -0.06271242 0.18384776 0.09823564  
0.02953644 0.2552092 ]  
[[0.26887423 0.45279974 0.22224124 0.09138517 -0.16099039 -0.52448195  
-0.53258747 0.30422634 -0.3725193 0.29582915]  
[-0.12550092 -0.09325094 0.4555833 -0.0958631 -0.08255563 0.08373097  
0.01824651 -0.4289042 0.12445372 0.18478629]  
[0.32280132 0.38279596 0.4184709 0.26465446 0.43553954 0.29052192  
-0.0828436 -0.21401943 0.07806575 0.15036821]  
[0.11635315 0.36407676 -0.2188294 0.2573196 -0.35195917 -0.3303508  
-0.05461726 -0.3314517 -0.12673706 0.40886837]  
[-0.02637121 0.45349354 -0.16907734 -0.00537185 -0.00829003 0.07558303  
0.2538797 -0.30977976 -0.38567063 -0.17837937]  
[0.09754347 0.03683396 -0.27530393 -0.25269094 0.16854264 -0.03815742  
-0.200267 0.3099161 -0.32596308 -0.4245975 ]  
[-0.49743262 0.31426772 -0.17975017 -0.04912983 -0.04633005 -0.08907597  
-0.02987804 -0.20601809 -0.23974733 0.2420498 ]  
[0.36283228 -0.15096371 0.02609632 0.2749996 -0.14999084 0.09229194  
0.21820739 0.17661752 -0.28185967 -0.07774481]  
[0.20746058 -0.43270284 0.43531844 0.3479411 0.10841728 0.14206463  
0.50706077 -0.00784688 0.0515137 -0.21333359]  
[0.19777277 -0.41886345 0.17474332 0.11205389 -0.36495268 0.12211294  
0.05662481 -0.32473215 -0.31006843 -0.08672605]  
[-0.36377627 0.252149 0.0561618 -0.37809843 0.45860985 -0.16861506  
0.5656371 -0.17449029 -0.098297 0.47890952]  
[-0.3106002 -0.10483637 0.1588342 0.08708548 0.17774974 0.341765  
0.18166223 -0.26750183 -0.31181377 0.06440311]  
[0.3038521 0.39506602 -0.23715518 -0.14822073 0.0257976 -0.4520908  
-0.054522 -0.48982665 -0.06752169 -0.03472788]  
[0.22147071 0.5248831 -0.08589602 0.09116683 0.19404814 0.27111337  
-0.3298357 -0.03669334 -0.40201673 0.25292727]  
[-0.13051206 0.20953256 0.3370025 -0.388729 0.08703692 0.36645365  
-0.36851263 0.16904317 -0.11516258 -0.04445205]  
[0.21601044 -0.4221891 0.20453636 0.1995395 0.3721692 0.24483417  
0.05585273 0.18223785 -0.06377491 -0.23265006]  
[0.6110041 0.42807847 -0.5878709 0.28362423 -0.07893253 -0.36786282  
-0.22682798 -0.39196515 -0.07824615 -0.57036597]  
[0.25566617 0.29397285 -0.28232044 0.3857544 0.05894935 -0.0960045  
-0.03518242 0.11878221 0.13571447 0.20067507]  
[0.3125158 0.31065443 0.02232686 0.33816284 -0.5066478 -0.2557866  
0.34958157 0.23836939 0.22759253 0.38779286]  
[0.5426001 0.40520036 -0.43362772 -0.18968436 0.11095471 -0.2835415  
0.0170093 -0.06144131 0.05897224 -0.4090478 ]]  
[0.19590585 0.09456912 0.10723506 0.0302897 -0.07176765 -0.06410553  
0.02954351 -0.07927987 0. -0.00405005]

[[ 0.29159766] [ 0.61834085] [-0.85857546] [ 0.35116577] [-0.4722261 ] [-0.6416783 ] [-  
0.52023816] [-0.6450654 ] [-0.576956 ] [-0.6816955 ]]  
[0.08841445]

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Train Loss: 0.0526  
Test Loss: 0.0604  
Train Accuracy: 0.9980  
Test Accuracy: 1.0000  
F1-Score (Weighted): 0.3766

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## Technical Report: Cancer Dataset with 1 Hidden Layer ANN

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Algorithm: Artificial Neural Network (ANN) with 1 Hidden Layer

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Model Architecture:  
Model: "sequential\_31"

Layer (type)	Output Shape	Param #
dense_93 (Dense)	(None, 20)	620
dense_94 (Dense)	(None, 10)	210
dense_95 (Dense)	(None, 1)	11

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Total params: 841  
Trainable params: 841  
Non-trainable params: 0

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Initial Settings:  
Sampling the parameters k0 and k1 from some distribution: Using default initialization in Keras (uniform or normal)

-----  
Parameter Updates on Epochs:  
Training the model using Adam optimizer with default settings.

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Final Parameter Values at the End of Training:

[[ 0.02140307 -0.32673177 0.13469455 0.05497742 0.00721207 0.10469425  
-0.32351628 0.02773789 -0.05030099 0.04996806 -0.2537241 -0.1752662  
0.00700039 0.13331199 -0.254122 -0.19818668 -0.3111359 -0.2447611  
0.12380728 -0.19744526]  
[-0.30720282 -0.25726426 -0.13135824 0.04152307 -0.2933971 -0.1238405  
0.16668683 0.13690889 0.31515455 0.32519692 0.11354175 -0.09520081  
-0.31289184 -0.06165695 0.29408592 -0.10268351 -0.14833808 -0.23545519  
0.07177492 -0.14777617]  
[ 0.3351293 -0.03662027 0.09396309 0.20106523 -0.19233988 -0.27274388  
0.11126906 0.22258776 0.14802352 0.18908042 0.32243517 0.13736728  
0.3009563 -0.09376445 -0.18830165 -0.10698946 -0.18809274 -0.17664696  
0.22602291 -0.26548448]  
[-0.03463848 -0.35708508 -0.23584461 -0.2942067 0.0323362 0.1586746  
0.15867269 -0.06941864 -0.0255959 0.29460984 -0.26241052 -0.18555056  
0.2617479 0.24378544 -0.31387573 -0.26639405 0.07487344 -0.09890029  
0.22725102 0.01749691]  
[-0.16247824 -0.18685919 0.32873893 -0.26413548 0.16598739 -0.08767176  
0.16547024 -0.20018503 0.19119537 -0.07918358 0.03316377 -0.02457634  
0.02595642 0.09457982 0.33091527 -0.10906364 -0.18230918 0.29537106  
-0.20099181 0.16647673]  
[-0.20135432 -0.08920498 -0.24549723 0.08545995 -0.04527692 0.17861676  
-0.12479806 0.26280147 -0.1816081 0.0678857 -0.3116825 -0.18652183  
0.33547968 0.24587756 -0.14020096 0.05861473 -0.15223807 0.12707517  
0.28456777 0.2907496 ]  
[ 0.24510323 -0.33805144 0.29178602 -0.01419485 0.02393361 0.20256084  
-0.18319854 0.23011976 0.09663805 0.08999634 0.29736242 -0.34111047  
0.12566262 0.04412884 0.01089263 0.3214 -0.10565629 -0.03612474  
-0.29437435 -0.14207222]  
[-0.23343857 -0.05601735 -0.03398001 0.02211895 -0.25230995 -0.01272523  
-0.05650818 0.145711 0.10592452 0.21653384 -0.19013974 0.17433119  
-0.06638899 0.2523051 0.17196101 0.01791406 -0.29757747 0.09069291  
0.18485887 0.09355173]  
[ 0.0081189 0.20931731 -0.2903156 0.28633112 0.0522824 -0.16350546  
0.26155108 -0.17721435 0.24348557 0.03168127 -0.12069977 0.22277528  
0.2290886 0.07977048 -0.0025475 0.3382833 -0.11169779 0.19948995  
0.04220512 -0.13312088]  
[ 0.06992768 -0.26221442 -0.01510343 -0.24726467 0.14489408 -0.04725215  
0.28454995 0.02162313 -0.13837323 0.187576 0.1901364 -0.3157897  
-0.15902741 0.05714634 0.05334851 -0.19890042 0.1646971 0.19964606  
0.34273207 -0.12956709]  
[ 0.06125348 0.12054161 0.19571543 0.34020415 -0.01229602 0.34019917  
-0.09100372 0.25180507 -0.25465852 -0.33296952 0.21222991 -0.28255785  
0.13257527 0.04761225 0.28238046 -0.03909469 0.02303831 0.15412104  
0.342487 -0.06662568]  
[ 0.09147773 0.13343117 0.28814167 0.1649345 -0.3210514 0.2041328  
-0.3041468 -0.16474193 -0.06146964 0.2546926 -0.04908301 0.21134138  
0.14262319 0.07049993 -0.3257398 0.06141958 0.0047157 0.2305929  
0.06571607 -0.25044143]  
[-0.05014163 0.04833896 0.24675441 0.20471829 0.14197783 0.08203009  
-0.135916 -0.31588203 -0.16771255 0.17698193 0.28688538 0.04319695  
0.32084346 -0.01626128 0.14427903 0.28440428 0.21604264 -0.32695493  
-0.22152147 -0.17725582]  
[ 0.31977707 -0.24586658 0.09130344 0.15679134 -0.33480042 -0.20643103  
0.30507296 0.1939714 -0.20944072 0.21971369 0.21056916 0.19085282  
-0.20651643 0.27748424 0.30278176 0.15191397 -0.15040423 0.08333096  
-0.26328254 0.11485603]  
[-0.18730333 -0.15252432 0.21273774 0.2554737 0.06432079 0.27158707  
-0.11766306 -0.08372253 -0.110236 0.13030455 0.2530154 0.21088475  
0.04479393 -0.02052665 -0.17756942 0.03969553 0.16908589 0.13567027

-0.03724772 -0.2913755 ]  
[ 0.04407192 0.04908916 0.16192567 -0.34847957 -0.14090906 0.13453647  
0.08077347 -0.17673402 -0.12746143 -0.21005346 -0.06578153 0.1153942  
-0.05282092 -0.09923932 0.16703975 0.24713689 0.20507763 0.32797247  
-0.24673644 -0.02319375]  
[-0.04745735 -0.0147099 0.2132926 -0.20782112 -0.17131642 -0.33105162  
0.24029523 -0.09493148 -0.0962697 -0.1419717 -0.02153426 0.01582974  
-0.3325839 -0.20823845 0.05945757 0.01288751 -0.3034251 0.21532935  
-0.30322322 0.1325377 ]  
[ 0.30639523 0.15203643 0.19094455 -0.1524317 0.20092604 0.11113486  
0.1497457 -0.23733859 0.06501871 0.3186763 0.13634464 -0.26187658  
0.3328563 0.0099245 -0.1244871 0.3184225 -0.26514152 0.23588353  
-0.01469001 0.29319936]  
[-0.2871732 0.23591787 -0.3322757 0.08944975 -0.19248743 0.2824238  
0.31385505 0.27119255 -0.08323789 -0.29527122 -0.30979842 0.11139989  
0.2574705 -0.10467774 -0.09019762 -0.25787508 0.05051955 0.18626308  
0.15344955 -0.22985259]  
[ 0.2551738 0.20346637 0.14594927 -0.25550976 -0.16658777 0.05539939  
-0.19804461 0.24138355 -0.19484416 -0.09573787 0.03402818 -0.29984805  
0.3407446 -0.22333643 -0.02422243 -0.31855538 -0.20724076 -0.05127704  
0.07604753 -0.17486747]  
[-0.0133497 0.1006799 -0.28831673 -0.27259263 0.07575176 -0.19124237  
-0.07185665 -0.05304018 -0.22949398 0.28546 -0.13394417 0.184407  
0.13814783 0.20462877 -0.0666911 0.00322053 0.0653486 -0.12570052  
0.3200683 -0.01965731]  
[ 0.21625586 -0.04937698 -0.20174344 -0.29182455 -0.25942463 -0.30657926  
-0.06635585 -0.3236737 0.26183558 0.15517032 0.04619844 -0.18256912  
-0.24298796 -0.01529256 0.14529845 -0.3140505 0.31926814 0.30592084  
-0.21113378 0.18564445]  
[ 0.27632248 0.02569206 -0.07418728 -0.18652768 -0.36405537 -0.31961322  
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0.09444626 0.25611252]]  
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0. 0. 0. 0. -0.00799333 0.  
0.00484075 0. ]  
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[ 2.49943763e-01 -6.02648035e-02 2.09354013e-01 2.74016321e-01

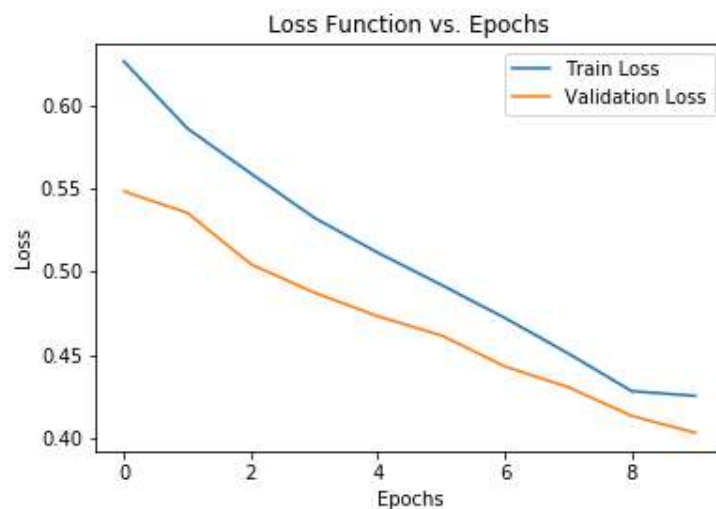


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[ 0.0328754 -0.02034854 -0.00777523 -0.01249924 -0.03861101 -0.05565384  
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[ 0.13136321]  
[ 0.30590504]  
[-0.7086224 ]  
[ 0.6479376 ]  
[ 0.5318493 ]  
[-0.22500272]  
[-0.04608713]  
[-0.67378676]]  
[-0.00097962]

-----

Train Loss: 0.4256  
Test Loss: 0.3846  
Train Accuracy: 0.8484  
Test Accuracy: 0.8772  
F1-Score (Weighted): 0.4780

---



## Technical Report: Digit Dataset with 1 Hidden Layer ANN

-----  
Algorithm: Artificial Neural Network (ANN) with 1 Hidden Layer  
-----

Model Architecture:  
Model: "sequential\_35"

Layer (type)	Output Shape	Param #
dense_105 (Dense)	(None, 20)	15700
dense_106 (Dense)	(None, 10)	210
dense_107 (Dense)	(None, 10)	110

=====

Total params: 16,020  
Trainable params: 16,020  
Non-trainable params: 0

-----

Initial Settings:

Sampling the parameters k0 and k1 from some distribution: Using default initialization in Keras (uniform or normal)

-----

Parameter Updates on Epochs:

Training the model using Adam optimizer with default settings.

-----

Final Parameter Values at the End of Training:

[[ -1.08769685e-02 -4.45925854e-02 -3.01698484e-02 ... -6.21014386e-02  
1.01876184e-02 -5.25585674e-02]  
[ 6.40667379e-02 -4.91866469e-03 -1.16736963e-02 ... -4.26834077e-03  
-4.67929207e-02 4.80872989e-02]  
[ 1.58771351e-02 4.06783521e-02 4.80463654e-02 ... -1.00507736e-02  
-4.65288758e-05 -7.19533563e-02]  
...  
[-5.06473631e-02 -5.47243431e-02 5.31189293e-02 ... -1.70828179e-02  
2.37546787e-02 2.97891349e-03]  
[-1.54903382e-02 -4.34680730e-02 7.50987530e-02 ... 2.47796327e-02  
-6.36286512e-02 -1.41519606e-02]  
[ 1.58047602e-02 -6.87398762e-02 4.87469137e-04 ... 8.58399272e-02  
2.71297023e-02 5.23832440e-03]]  
[ 0.2322312 -0.37883985 0.69367987 -0.42611554 -0.5151869 -0.36155125  
-0.1698336 -0.58113986 0.38717952 0.2137768 -0.51435333 -0.31316152  
0.24136212 -0.5173022 -0.0071047 -0.54857093 -0.24352494 0.43230566  
-0.27279252 -0.21660289]  
[[ -0.27922037 -1.551568 1.4573364 -0.4399575 0.13082662 -0.13342  
1.0305192 -2.2633333 1.6800023 -0.758185 ]  
[-3.0178323 -1.4610692 -1.3989427 1.5290576 -1.88731 1.0623841  
-0.8255254 0.4944504 1.6633197 1.4686885 ]  
[ 0.09330206 1.3916963 0.6114861 -1.6906072 -1.3944621 0.29395708  
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[ 1.1338053 1.1277349 -1.2068374 0.8290497 0.4924344 1.1767125  
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[ 1.149706 -1.4247541 1.8232331 0.93921775 -1.1041785 0.74863625  
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[-0.09213752 -1.5146028 0.3035718 -1.7101027 1.3369305 1.635819  
-0.07559646 -0.24857722 0.59164834 0.03305411]  
[-2.676154 -0.17458531 -0.6002074 1.1467166 0.5376678 0.97467554  
-0.2072953 0.6452385 2.672085 0.67043954]  
[ 0.22261459 0.7701188 0.6409188 1.3673801 -0.39238548 -1.126123  
-0.98031765 1.3562874 0.954949 0.44356605]  
[ 1.4378453 1.3928682 -0.5492212 -0.32175463 0.34759578 -2.808513  
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[ 0.8263271 0.21412106 -1.1682631 -0.13073765 1.5598925 0.36650595  
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[ 1.8221283 -1.0475099 1.0942936 -0.46091256 -0.73684186 -0.12804298  
0.56445384 -1.6581588 -1.414117 0.40513414]  
[-3.254315 -0.36599365 0.49074405 1.4632865 1.5759121 0.14144528  
1.1396765 -0.7460464 -1.6966637 -2.3037808 ]  
[-1.5570627 -0.04615814 -0.54752356 -1.0056459 0.8822406 1.3395735

```

0.27873757 0.04708897 2.247508 1.2785124 ]
[-0.37678984 -0.38091362 0.68836415 1.3656361 0.95412683 -0.58224404
0.22097743 1.3770489 -1.2037172 -1.8730638 ]
[-1.9956089 -0.9935106 0.39285213 -1.770273 1.8394192 2.330506
-0.23452097 0.07543264 0.3809124 -0.03277276]
[-0.68313694 -0.6333134 1.2447531 1.5011382 -1.124482 -1.2923734
-0.75422317 0.11590034 1.1335497 0.9334412 ]
[-1.3041893 0.6972522 -2.1388197 -0.8001723 0.29920685 0.78258765
1.6970446 0.620091 0.11049173 -1.4118677 ]
[-0.8957206 1.6232914 -0.5340664 0.00599921 -2.304052 0.06856627
0.6326461 -0.26744133 -0.29243782 2.3958805 ]
[-0.8795538 0.30418196 0.18234377 2.0340164 0.04330771 -1.307262
-0.97648025 0.46648562 1.5011333 -0.2761144 ]]
[-0.3764867 0.14357935 0.19474727 0.11366648 0.49456856 -0.03543773
0.3608377 0.07350972 0.44202435 -0.40964082]
[[-2.3451493 -3.3642507 -2.9147954 2.5633845 -2.8235037 0.11722255
-2.0788403 -2.2635949 2.04105 3.279854 ]
[-3.8484004 2.0773354 -3.0831196 -2.454853 1.7506506 1.0970306
-3.6154997 1.2293074 0.48256764 1.6080998 ]
[2.266727 -2.770888 0.12768382 1.1445159 -2.507885 1.9055017
-0.11202426 -3.186284 0.650969 -2.6148672 ]
[-1.0875747 1.7816195 0.64417654 0.7437352 -4.4810557 1.3272803
-2.4516757 1.273087 0.99398774 -2.8055425 ]
[1.096673 -2.6746967 0.05151384 1.5784352 0.81009996 -1.4083718
-4.5618925 1.8951851 -3.484503 0.95084065]
[2.1035876 -3.5239553 2.3922696 -2.8212047 0.74619913 -3.264453
2.1586976 0.28576455 -0.8471836 0.3462855 ]
[1.645021 -3.3822365 -3.7676826 -2.1011631 0.4442903 1.9422116
1.4239213 0.644508 -1.7571229 1.171525 ]
[-2.5761619 1.6197652 1.4046855 0.21781924 -0.5758149 -4.6338687
-3.4914703 2.1785886 1.3952993 -0.8461805 ]
[-4.0738173 2.7786076 0.7704894 0.90370476 2.3048706 0.58916295
1.7586018 -1.0412892 -3.1585019 -4.0367074 ]
[-1.9468762 0.63512564 0.72074 -2.137064 0.88045865 0.24428712
1.8654993 -3.9278417 1.3820177 0.11993939]]
[0.6016844 0.32662675 -0.22327128 0.11939763 -0.61039853 -0.17113623
0.8986623 -0.5433172 0.06406263 -0.16494776]

```

---

Train Loss: 0.1661

Test Loss: 0.1886

Train Accuracy: 0.9526

Test Accuracy: 0.9448

F1-Score (Weighted): 0.4780

---

