Assignment2PEF_AY23_24 Group 14

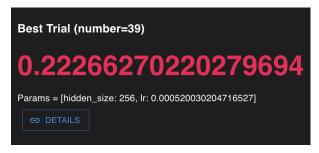
Idda, Raffaeli, Riondato, Stillo

1 Random Hyperparameter

Our purpose was to find the optimal hyperparameters of the gradient descent rule, i.e. the ones that minimize the loss function. To do so, we have chosen a random test setup and run the search on DNN with 10 and 50 trials. Increasing the number of trials could bring better results in terms of optimized hyperparameters, as the algorithm will have a better chance of finding combinations of hyperparameters that improve model performance. The discovered values are as follows:



(a) n_trials=10



(b) $n_{\text{trials}}=50$

EM_priceDNN-point-random_50

0 COMPLETE 0.32271165788173676 512 0.001490985842573223 1 COMPLETE 0.26065072417259216 512 2.855790679080029e-05 2 COMPLETE 0.26065072417259216 512 2.8557906790800029e-05 3 COMPLETE 0.24891955077648163 576 0.000160369866720169647 4 COMPLETE 0.2447175667062378 704 0.0001003698667204706 5 COMPLETE 0.2447175667062378 704 0.00010036986667204706 6 COMPLETE 0.2448846399784088 704 3.15856192230705556-05 8 COMPLETE 0.2448846399784088 704 3.15856192230705556-05 9 COMPLETE 0.7920532822608948 320 0.0602315781676299 10 COMPLETE 0.7240934275975229736 832 0.0038918884613221554 11 COMPLETE 0.24209348583221436 704 0.01172667974692062 12 COMPLETE 0.24409348583221436 704 0.01172667974692062 13 COMPLETE 0.2594795525074005 128		EM_priceDNN-point-random_50				
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9 COMPLETE 0.7920532822608948 320 0.06023215781676299 10 COMPLETE 0.24019427597522736 832 0.0038918884613221554 11 COMPLETE 0.2608911395072937 704 1.897641769358223e-05 12 COMPLETE 0.24809348583221436 704 0.01172657974992062 13 COMPLETE 0.23795364797115326 192 0.0004980023593179826 14 COMPLETE 0.27711986303329468 896 0.044719765648669726 15 COMPLETE 0.7765157294273376 576 0.029819972203391134 17 COMPLETE 0.26594795525074005 128 0.02363376805517803 18 COMPLETE 0.26594795525074005 128 0.02363376805517803 19 COMPLETE 0.24626068770885468 768 4.555008072794493e-05 18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.2599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.2399032711982727 334 0.00562364206813127 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.234291867017746 512 0.0008412837752345288 28 COMPLETE 0.234291867017746 512 0.0008412837752345288 28 COMPLETE 0.23250731825825525 704 0.001633541038383-05 50 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7	COMPLETE	0.2448846399784088	704	3.1585619223070555e-05	
10 COMPLETE 0.24019427597522736 832 0.0038918884613221554 11 COMPLETE 0.2608911395072937 704 1.897641769358223e-05 12 COMPLETE 0.24809348583221436 704 0.01172657974692062 13 COMPLETE 0.23795364797115326 192 0.0004980023593179826 14 COMPLETE 0.7711986303329468 896 0.044719765548669726 15 COMPLETE 0.2594795525074005 128 0.02363376805517803 16 COMPLETE 0.2594795525074005 128 0.02363376805517803 17 COMPLETE 0.24626068770885468 768 4.555008072794493e-05 18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 21 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 22 COMPLETE 0.2527635890007019 960 1.4474775331160664e-05 23 COMPLETE 0.2307414412498474 704 0.0007603043026803127 24 COMPLETE 0.2307414412498474 704 0.0007603043026803127 25 COMPLETE 0.2307671982727 334 0.005627612406115842 26 COMPLETE 0.2427065670490265 704 0.00010037493107644612 27 COMPLETE 0.2667083442211151 192 0.0001437505844431266 28 COMPLETE 0.2667083442211151 192 0.000143750584443154529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2362519882545471 512 4.4793171668043383e-05 29 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.230823168277405 640 0.0015851587699397644 31 COMPLETE 0.2308231682777405 640 0.001409198448678033 36 COMPLETE 0.2308231682777405 640 0.001409198448678033 37 COMPLETE 0.2308231682777405 640 0.001409198448678033 38 COMPLETE 0.2308231682777405 640 0.0015851587699397644 39 COMPLETE 0.2308231682777405 640 0.001693198448678033 39 COMPLETE 0.2308231682777405 640 0.001693198448678033 39 COMPLETE 0.2308231682777405 640 0.0078606039134391391742 40 COMPLETE 0.2308231682777405 640 0.007860603030247176527 40 COMPLETE 0.2266270220279694 256 0.00577963633391391742 40 COMPLETE 0.22682160782814026 320 0.00056	8	COMPLETE	0.8141405582427979	768	0.04016235941640559	
11 COMPLETE 0.2608911395072937 704 1.897641769358223a-05 12 COMPLETE 0.24809348583221436 704 0.01172657974692062 13 COMPLETE 0.23795364797115326 192 0.0004980023593179826 14 COMPLETE 0.7711986303329468 896 0.044719765848669726 15 COMPLETE 0.2594795525074005 128 0.02363376805517803 16 COMPLETE 0.7696157294273376 576 0.029819972203391134 17 COMPLETE 0.24626068770885468 768 4.555008072794493-0-5 18 COMPLETE 0.22521635890007019 960 1.4474775331160664-0-5 20 COMPLETE 0.259701881408691 576 0.029384702810435866 21 COMPLETE 0.259701881408691 576 0.029384702810435866 22 COMPLETE 0.259701881408691 576 0.029384702810435866 22 COMPLETE 0.259701881408691 576 0.029384702810435866 22 COMPLETE 0.230714412498474 704 <t< th=""><th>9</th><th>COMPLETE</th><th>0.7920532822608948</th><th>320</th><th>0.06023215781676299</th></t<>	9	COMPLETE	0.7920532822608948	320	0.06023215781676299	
12 COMPLETE 0.24809348583221436 704 0.01172657974692062 13 COMPLETE 0.23795364797115326 192 0.0004980023593179826 14 COMPLETE 0.7711986303329468 896 0.044719765848669726 15 COMPLETE 0.2594795525074005 128 0.02363376805517803 16 COMPLETE 0.7665157294273376 576 0.029819972203391134 17 COMPLETE 0.24626069770885468 768 4.5550080727944938-05 18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2251635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 21 COMPLETE 0.2507414412498474 704 0.0007603043026803127 22 COMPLETE 0.2307414412498474 704 0.0007603043026803127 23 COMPLETE 0.2499032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23550731825828552 704 0.0015851587693937644 31 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 34 COMPLETE 0.2651110589504242 256 7.004039595447725 35 COMPLETE 0.2651110589504242 256 7.004039595447725 36 COMPLETE 0.2651110589504242 256 7.004039595447725 37 COMPLETE 0.2651110589504242 256 7.005457202930827474 39 COMPLETE 0.2651110589504242 256 7.005457202930827474 40 COMPLETE 0.2651110589504242 256 7.005457202930827474 41 COMPLETE 0.2651110589504242 256 7.005457202930827474 42 COMPLETE 0.2651110589504242 256 7.005457202930827474 43 COMPLETE 0.2651170582614026 320 0.0052673229395447725 44 COMPLETE 0.265276982814026 320 0.005267343891391742 45 COMPLETE 0.228021859109027124 704 2.26525481440767 46 COMPLETE 0.23806137597187805 344 0.0067343891391742 47 COMPLETE 0.2280476303635 256 0.013217631831398178 45 COMPLETE 0.22804538905620575 960 0.007786606919482678	10	COMPLETE	0.24019427597522736	832	0.0038918884613221554	
13 COMPLETE 0.23795364797115326 192 0.0004980023593179826 14 COMPLETE 0.7711986303329468 896 0.044719765848669726 15 COMPLETE 0.2594795525074005 128 0.02363376805517803 16 COMPLETE 0.7065157294273376 576 0.029819972203391134 17 COMPLETE 0.24626088770885468 768 4.555008072794493e-05 18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.7599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.3307414412498474 704 0.0007603043026803127 23 COMPLETE 0.2399032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.26567083442211151 192 0.00014375058444321607 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.23118770122528076 896 0.003734714529077203 28 COMPLETE 0.23118770122528076 892 0.021189860184112085 29 COMPLETE 0.23526159882545471 512 4.4793171668043383e-05 20 COMPLETE 0.23526159882545471 512 4.4793171668043383e-05 20 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 21 COMPLETE 0.23593385988252 704 0.0015851587699397644 31 COMPLETE 0.23593358644008636 320 0.0002671320395447725 33 COMPLETE 0.230937358644008636 320 0.0002671320395447725 34 COMPLETE 0.23093735864408636 320 0.0002671320395447725 35 COMPLETE 0.230987358644008636 320 0.0002671320395447725 36 COMPLETE 0.230987358644008636 320 0.0002671320395447725 37 COMPLETE 0.23098735864408636 320 0.0002671320395447725 38 COMPLETE 0.23098735864008636 320 0.000567389391391742 39 COMPLETE 0.252581699027124 566 0.000520030204716527 40 COMPLETE 0.252581090927124 704 2.262548146015587e-05 0.00052030204716527 41 COMPLETE 0.25395147282421 404 0.0017466171759686724 42 COMPLETE 0.25395147282421 404 0.0017466171759686747 43 COMPLETE 0.253951472828241 404 0.0017466171759686724 44 COMPLETE 0.253951472828241 404 0.0017466171759686724 45 COMPLETE 0.253951472828241 404 0.001746609131831181 45 COMPLETE 0.2538361472828241 404 0.0017466091482678	11	COMPLETE	0.2608911395072937	704	1.897641769358223e-05	
14 COMPLETE 0.7711986303329468 896 0.044719765848669726 15 COMPLETE 0.2594795525074005 128 0.02363376805517803 16 COMPLETE 0.7065157294273376 576 0.029819972203391134 17 COMPLETE 0.24626068770885468 768 4.555008072794493e-05 18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.7599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.8169125318527222 832 0.04163276326556236 23 COMPLETE 0.2399032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.23118770122528076 896 0.003734714529077203 25 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.23250731825828552 704 0.0015851587699397644 32 COMPLETE 0.232507318258245471 512 0.0064722570463323814 31 COMPLETE 0.23250731825824026 32 0.0005673439319171e-05 33 COMPLETE 0.23250731825824026 32 0.000567343931391742 35 COMPLETE 0.2325073182582442 32 0.000567343891391742 34 COMPLETE 0.232521485996246338 32 0.000567343891391742 34 COMPLETE 0.2326627022079694 32 0.0005667343891391742 34 COMPLETE 0.24990324676036835 32 0.0005667343891391742 34 COMPLETE 0.24990324676036835 32 0.0005667343891391742 34 COMPLETE 0.24990324676036835 32 0.00056664413536056417 34 COMPLETE 0.24990324676036835 32 0.000566	12	COMPLETE	0.24809348583221436	704	0.01172657974692062	
15 COMPLETE 0.2594795526074005 128 0.02363376805517803 16 COMPLETE 0.7065157294273376 576 0.029819972203391134 17 COMPLETE 0.24626068770885468 768 4.555008072794493e-05 18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.7599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.2307414412498474 704 0.0007603043026803127 23 COMPLETE 0.2399032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2427065670490265 704 0.0001037493107644612 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.27817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2261110589504242 256 7.101083534109171e-05 34 COMPLETE 0.2309735864408636 320 0.0002671320395447725 35 COMPLETE 0.2309735864408636 320 0.0002671320395447725 36 COMPLETE 0.22621485996246338 192 0.0004722570463238346 37 COMPLETE 0.228214865996246338 192 0.000567343891391742 40 COMPLETE 0.228214865996246338 192 0.000567343891391742 41 COMPLETE 0.228214865996246338 192 0.000567343891391742 42 COMPLETE 0.22852160782814026 320 0.0005667343891391742 43 COMPLETE 0.2285281090927124 704 2.2625484146015587e-05 44 COMPLETE 0.2280214965996246338 192 0.000567343891391742 44 COMPLETE 0.2280473894226074 320 0.05836803008421114 45 COMPLETE 0.228047394226074 320 0.05836803008421114 46 COMPLETE 0.228047394226074 320 0.05836803008421114 47 COMPLETE 0.22804538905620575 960 0.0007786606919482678 48 COMPLETE 0.22804538905620575 960 0.0007786606919482678	13	COMPLETE	0.23795364797115326	192	0.0004980023593179826	
16 COMPLETE 0.7065157294273376 576 0.029819972203391134 17 COMPLETE 0.24626068770885468 768 4.555008072794493e-05 18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.7599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.23099032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2427065670490265 704 0.00014375058444321607 26 COMPLETE 0.233118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2374291867017746 512 0.4793171668043383-05 29 COMPLETE 0.320403050731825826525	14	COMPLETE	0.7711986303329468	896	0.044719765848669726	
17 COMPLETE 0.24626068770885468 768 4.5550080727944939-05 18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.7599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.8169125318527222 832 0.04163276326556236 23 COMPLETE 0.2399032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.0001037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.2318770122528076 896 0.003734714529077203 27 COMPLETE 0.2318770122528076 896 0.003734714529077203 28 COMPLETE 0.234291867017746 512 0.0008412837752345288 28 COMPLETE 0.23526189882545471 512	15	COMPLETE	0.2594795525074005	128	0.02363376805517803	
18 COMPLETE 0.22481055557727814 256 0.0036769419779233677 19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.7599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.8169125318527222 832 0.04163276326556236 23 COMPLETE 0.2399032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.0001037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.2318770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.2651110589504242 256	16	COMPLETE	0.7065157294273376	576	0.029819972203391134	
19 COMPLETE 0.2521635890007019 960 1.4474775331160664e-05 20 COMPLETE 0.7599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.8169125318527222 832 0.04163276326556236 23 COMPLETE 0.2399032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.2318770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383-05 29 COMPLETE 0.23250731825825525 704 0.0015851587699397644 31 COMPLETE 0.2651110589504242 256 7.101083534109171-05 32 COMPLETE 0.25097358644008636 320	17	COMPLETE	0.24626068770885468	768	4.555008072794493e-05	
20 COMPLETE 0.7599701881408691 576 0.029384702810435866 21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.8169125318527222 832 0.04163276326556236 23 COMPLETE 0.2939032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 32 COMPLETE 0.2651110589504242 256	18	COMPLETE	0.22481055557727814	256	0.0036769419779233677	
21 COMPLETE 0.2307414412498474 704 0.0007603043026803127 22 COMPLETE 0.8169125318527222 832 0.04163276326556236 23 COMPLETE 0.2939032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.20388231682777405 64 0.001409198448678033 37 COMPLETE 0.20388231682777405 64 0.001409198448678033 38 COMPLETE 0.2266270220279694 256 0.0052030204716527 40 COMPLETE 0.2266270220279694 256 0.00052030204716527 40 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.2300113797187805 384 0.006265441353605417 43 COMPLETE 0.2303361458778805 364 0.001409198448678033 45 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.23030113797187805 384 0.006265441353605417 43 COMPLETE 0.23033614587783813 128 0.001154111853219306 45 COMPLETE 0.22604538905620575 960 0.007786606919482678	19	COMPLETE	0.2521635890007019	960	1.4474775331160664e-05	
22 COMPLETE 0.8169125318527222 832 0.04163276326556236 23 COMPLETE 0.2399032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 34 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23088231682777405 64	20	COMPLETE	0.7599701881408691	576	0.029384702810435866	
23 COMPLETE 0.2399032711982727 384 0.005627612406115842 24 COMPLETE 0.2427065670490265 704 0.00010037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.20388231682777405 64 0.001409198448678033 37 COMPLETE 0.20388231682777405 64 0.001409198448678033 38 COMPLETE 0.20388231682777405 64 0.001409198448678033 39 COMPLETE 0.20388231682777405 64 0.001409198448678033 30 COMPLETE 0.2266270220279694 256 0.0052030204716527 40 COMPLETE 0.2266270220279694 256 0.00520030204716527 41 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.2300113797187805 384 0.006265441353605417 44 COMPLETE 0.23803113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2269725289344788 832 0.0004930930267007044 47 COMPLETE 0.22604538905620575 960 0.007786606919482678	21	COMPLETE	0.2307414412498474	704	0.0007603043026803127	
24 COMPLETE 0.2427066670490265 704 0.0001037493107644612 25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 34 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.20388231682777405 64 0.001409198448678033 36 COMPLETE 0.2028621485990246338 192<	22	COMPLETE	0.8169125318527222	832	0.04163276326556236	
25 COMPLETE 0.2667083442211151 192 0.00014375058444321607 26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.20388231682777405 64 0.00744722570463238346 37 COMPLETE 0.22632160782814026 320 </th <th>23</th> <th>COMPLETE</th> <th>0.2399032711982727</th> <th>384</th> <th>0.005627612406115842</th>	23	COMPLETE	0.2399032711982727	384	0.005627612406115842	
26 COMPLETE 0.23118770122528076 896 0.003734714529077203 27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.20388231682777405 64 0.00744722570463238346 37 COMPLETE 0.22821485996246338 192 0.00044722570463238346 38 COMPLETE 0.2266270220279694 256 </th <th>24</th> <th>COMPLETE</th> <th>0.2427065670490265</th> <th>704</th> <th>0.00010037493107644612</th>	24	COMPLETE	0.2427065670490265	704	0.00010037493107644612	
27 COMPLETE 0.2374291867017746 512 0.0008412837752345288 28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 34 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.2308231682777405 64 0.001409198448678033 36 COMPLETE 0.20388231682777405 64 0.00744722570463238346 37 COMPLETE 0.22821485996246338 192 0.00044722570463238346 38 COMPLETE 0.2266270220279694 256 0.000520030204716527 40 COMPLETE 0.2532581090927124 704 <th>25</th> <th>COMPLETE</th> <th>0.2667083442211151</th> <th>192</th> <th>0.00014375058444321607</th>	25	COMPLETE	0.2667083442211151	192	0.00014375058444321607	
28 COMPLETE 0.2526159882545471 512 4.4793171668043383e-05 29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.00044722570463238346 38 COMPLETE 0.2266270220279694 256 0.000520030204716527 40 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.23800113797187805 384 <th>26</th> <th>COMPLETE</th> <th>0.23118770122528076</th> <th>896</th> <th>0.003734714529077203</th>	26	COMPLETE	0.23118770122528076	896	0.003734714529077203	
29 COMPLETE 0.30403050780296326 832 0.021189860184112085 30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 34 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.00044722570463238346 38 COMPLETE 0.22632160782814026 320 0.0005067343891391742 39 COMPLETE 0.22266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.8152645230293274 448	27	COMPLETE	0.2374291867017746	512	0.0008412837752345288	
30 COMPLETE 0.23250731825828552 704 0.0015851587699397644 31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.00044722570463238346 38 COMPLETE 0.22632160782814026 320 0.0005067343891391742 39 COMPLETE 0.22266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.24990324676036835 256	28	COMPLETE	0.2526159882545471	512	4.4793171668043383e-05	
31 COMPLETE 0.7817985415458679 512 0.05457202930827474 32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.0004722570463238346 38 COMPLETE 0.22632160782814026 320 0.0005067343891391742 39 COMPLETE 0.22266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.23833614587783813 128 0.00154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	29	COMPLETE	0.30403050780296326	832	0.021189860184112085	
32 COMPLETE 0.2651110589504242 256 7.101083534109171e-05 33 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.00044722570463238344 38 COMPLETE 0.2266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.2763495147228241 64 0.0011466171759686724 46 COMPLETE 0.2269725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128	30	COMPLETE	0.23250731825828552	704	0.0015851587699397644	
33 COMPLETE 0.2742108106613159 128 1.2472480501168678e-05 34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.00044722570463238346 38 COMPLETE 0.22632160782814026 320 0.0005067343891391742 39 COMPLETE 0.22266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.23833614587783813 128	31	COMPLETE	0.7817985415458679	512	0.05457202930827474	
34 COMPLETE 0.23097358644008636 320 0.0002671320395447725 35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.00044722570463238344 38 COMPLETE 0.2266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	32	COMPLETE	0.2651110589504242	256	7.101083534109171e-05	
35 COMPLETE 0.23088231682777405 64 0.001409198448678033 36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.00044722570463238344 38 COMPLETE 0.2266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.23833614587783813 128 0.00154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	33	COMPLETE	0.2742108106613159	128	1.2472480501168678e-05	
36 COMPLETE 0.8038359880447388 576 0.05736439522213361 37 COMPLETE 0.22821485996246338 192 0.00044722570463238344 38 COMPLETE 0.2266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.23833614587783813 128 0.00154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	34	COMPLETE	0.23097358644008636	320	0.0002671320395447725	
37 COMPLETE 0.22821485996246338 192 0.000447225704632383424 38 COMPLETE 0.2266270220279694 256 0.000520030204716527 39 COMPLETE 0.22266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	35	COMPLETE	0.23088231682777405	64	0.001409198448678033	
38 COMPLETE 0.22632160782814026 320 0.0005067343891391742 39 COMPLETE 0.22266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	36	COMPLETE	0.8038359880447388	576	0.05736439522213361	
39 COMPLETE 0.22266270220279694 256 0.000520030204716527 40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678		COMPLETE	0.22821485996246338	192	0.00044722570463238346	
40 COMPLETE 0.8092074394226074 320 0.05836803008421114 41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	38	COMPLETE	0.22632160782814026	320		
41 COMPLETE 0.2532581090927124 704 2.2625484146015587e-05 42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	39	COMPLETE	0.22266270220279694	256	0.000520030204716527	
42 COMPLETE 0.8152645230293274 448 0.03779516531440767 43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	40	COMPLETE	0.8092074394226074	320	0.05836803008421114	
43 COMPLETE 0.23800113797187805 384 0.006265441353605417 44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	41	COMPLETE	0.2532581090927124	704	2.2625484146015587e-05	
44 COMPLETE 0.24990324676036835 256 0.013217631831398178 45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	42	COMPLETE	0.8152645230293274	448	0.03779516531440767	
45 COMPLETE 0.2763495147228241 64 0.00011466171759686724 46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	43			384	0.0002001110000000111	
46 COMPLETE 0.22679725289344788 832 0.0004930930267007044 47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678				256		
47 COMPLETE 0.23833614587783813 128 0.001154111853219306 48 COMPLETE 0.22804538905620575 960 0.007786606919482678	45	COMPLETE	0.2763495147228241	64	0.00011466171759686724	
48 COMPLETE 0.22804538905620575 960 0.007786606919482678	46	COMPLETE	0.22679725289344788	832	0.0004930930267007044	
49 COMPLETE 0.22617673873901367 704 0.001360054094991232	48	COMPLETE	0.22804538905620575	960	0.007786606919482678	
	49	COMPLETE	0.22617673873901367	704	0.001360054094991232	

(b) $n_{\text{trials}}=50$

EM_priceDNN-point-random_10

Number	State	Value	Param hidden_size	Param Ir		
0	COMPLETE	0.2752843499183655	128	1.9944694760531313e-05		
1	COMPLETE	0.23348571360111237	768	0.002719402203520313		
2	COMPLETE	0.2279129922389984	768	0.0006912418347127206		
3	COMPLETE	0.7164462804794312	576	0.022443033981790237		
4	COMPLETE	0.28741654753685	128	0.04272041787833153		
5	COMPLETE	0.2404654622077942	576	0.0001413731332191407		
6	COMPLETE	0.2514691948890686	64	0.024564692989973696		
7	COMPLETE	0.23557034134864807	192	0.003857085883050148		
8	COMPLETE	0.25652015209198	896	1.4862853490173438e-05		
9	COMPLETE	0.2820867598056793	64	4.3632591477522707e-05		

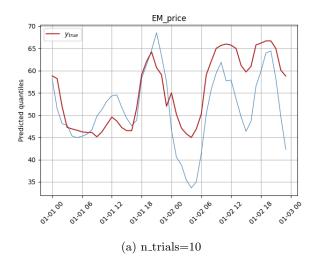
(a) n_trials=10

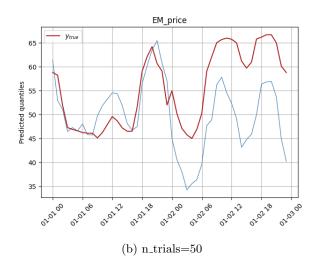
We can see that with more experiments the loss value becomes smaller, but is it enough? Indeed, we cannot rely solely on hyperparameters, as there are other factors to consider. For example, as observed in the table below, computational time increases consistently (by a factor of 5) while we increment n_trials.

	Computation time
n_tials=10	54.9 seconds
n_tials=50	254.8 seconds

Table 1: Computation time

Another feature to keep in mind is the approximation of the EM_price. We can observe that the approximation of the actual value of the price, from 01-02 00 until the end, is worse with 50 trials.





N.B. When we changed the number of n_trials, we paid attention to delete the previous one from the dashboard, to prevent the accumulation of experiments. Moreover, using a random test set every time we run the code the results were slightly different.