Book Keycodes:

Red – Quotable Text

Green – Important info for a quick recap

Purple – Useful Graphs in the book

Orange – Look up more

Book Quotes

Pg 2 at the bottom different types of nn connections

Pg 50 just defore chart this has historicly been a source of issues in the world of deep learning

Resources That have been viewed/read

1: Link: <https://github.com/getnamo/tensorflow-ue4> Type: Download Use: Connect UE4 Car Simulation To TensorFlow API Date: 15th OCT 2020

2: Link: <https://ieeexplore.ieee.org/abstract/document/155228> Type: Knowledge Use: Read Of Potential Methods Date: 16/10/20

3: Link: <https://ieeexplore.ieee.org/abstract/document/109558> Type: Knowledge Use: Research into VLSI neural Network talked about above Date: 16/10/20 Ref: 2

4: Link: <https://www.projectsmart.co.uk/7-project-management-types-and-when-to-use-them.php> Type: Knowledge Use: Summary of 7 project management methodologies Date: 16/10/20

5: Link: <https://www.apm.org.uk/resources/find-a-resource/agile-project-management/> Type: Knowledge Use: Understanding different Project management methodologies Date: 16/10/20

6: Link: <https://www.asimovinstitute.org/neural-network-zoo/> Type: knowledge Use: Summary of a large number neural network architectures Date: 23/10/20

7: Link: <https://www.tensorflow.org/resources/learn-ml/basics-of-machine-learning> Type: Knowledge Use: Recommended Steps to learn TensorFlow Date: 30/10/20

8: Link: <https://www.manning.com/books/deep-learning-with-python> Type: Knowledge Use: To Know what book to get Date: 30/10/20

9: Link: <https://www.udacity.com/course/intro-to-tensorflow-for-deep-learning--ud187> Type: Knowledge Use: Practice and learn ML (I will buy the book) Date: 30/10/20

10: Link: <https://www.coursera.org/professional-certificates/tensorflow-in-practice> Type: Knowledge Use: Practice and Learn ML Date: 30/10/20

11: Link: tensorflow.org/tutorials/keras/classification Type: Knowledge Use: Practice ML through tutorials Date: 30/10/20

12: Link: <https://www.oreilly.com/library/view/hands-on-machine-learning/9781492032632/> Type: knowledge Use: go deeper with TensorFlow (I will buy the book) Date: 30/10/20

Nvidea self driving car paper – Layouts (Fully connected dense layers going from large to small)

Not directly comparable as the ai in the paper takes images and then uses that to steer so to compensate Ive lowered the amount of layers and size of each layer

<https://images.nvidia.com/content/tegra/automotive/images/2016/solutions/pdf/end-to-end-dl-using-px.pdf>

“End2End learning can also be formulated as a backpropagation algorithm scaled up to complex models. The paradigm was first introduced in the 1990s, when the Autonomous Land Vehicle in a Neural Network (ALVINN) system was built [110]. ALVINN was designed to follow a pre-defined road, steering according to the observed road’s curvature” <https://arxiv.org/pdf/1910.07738.pdf>

Paper about different ai methods (old method that worked with a camera)

Took out camera by still using background layers (backprop) Took out camera as it would involving the car being one frame behind at best or at worst have to simple render the game world save the images and then feed that into gpu (not suitable for a gameing system as this would have too much overhead)

Unclassified paper about ALVINN <https://apps.dtic.mil/sti/pdfs/ADA218975.pdf>

used 40 epocs with 1200 data sets

only two layers

1217 input layer

29 hidden layer

46 output layer

<https://towardsdatascience.com/comparison-of-activation-functions-for-deep-neural-networks-706ac4284c8a>

Using sigmoid function as output activation function to allow the steering needed as sterring is linear on the UE4 Car Template and not yes or no

using leaky-ReLU to prevent vanishing gradient problem as it effects neural networks using back prop worth taking the slight performance hit for using it

looking back on reasearch not gonna train 32 16 8 2 Neural network as its just excessive gonna switch to 16 2 layout

<https://shaoanlu.wordpress.com/2017/05/29/sgd-all-which-one-is-the-best-optimizer-dogs-vs-cats-toy-experiment/> SGD Vs Adam

<https://arxiv.org/abs/1712.07628> SGD VS Adam

SGD is better at larger epochs and Adam better for mroe complex optimisations

Worth testing on both as i had some sucsess with Adam and SGD due to paper

Auto Testing would orginaly be:

Model Layout -> Optimiser -> sensor Arangement -> DataLength -> Epochs

3 -> 2 -> 3 -> 2139 -> 30

1,155,060 combonations at 30 seconds each avg would take ----- Weeks

1,155,060 \* 30(seconds) = 34,651,800 seconds

34,651,800 / 60 (60 seconds in a minet) = 577,530 minets

577,530 / 60 (60 minets in an hour) = 9,625.5 hours

9,625.5 hours / 24 (hours in a day) = 401.0625 days

401.0625 days / 7 (seven days in a week) = 57.2946428514286 weeks

with logical reductions some optimisations

3 -> 2 -> 3 -> 500 -> 30

270,000 combinations at 30 avrage would take 13.39285714285714 Weeks

(skipping typeing)

with more reductions by adding ranges (dont do 1 epoch and 1 data as it would highly likely be useless)

3 -> 2 -> 3 -> 100 -> 25

100 is (amount of connections -50 / + 50) so 1 -> 120 // 110 -> 210 // 222 -> 322

45,000 combinations at 30 seconds avrage would take 2.232142857142857 Weeks

Could reasiticly do that but would be cutting it close so will reduce +50/-50 for data to +25/-25

3 -> 2 -> 3 -> 50 -> 25

22,500 would take 1.116071428571429 Weeks

Could reasiticly do that but would be cutting it close so will reduce +25/-25 for data to +15/-15 I would then check this data and if no sutable ai has been calculated then look for best match and search within those perameters (take out ai layout and optimiser and sensor arrangement) allowing faster serach

3 -> 2 -> 3 -> 30 -> 25

13, 500 would take 0.6696428571428571 or 4.6875 days

reducing a futher 5 could still keep posibilitys up

3 -> 2 -> 3 -> 20 -> 25

9,000 would take 3.125 days or 0.4464285714285714 Weeks

Will do the second option and the time taken isnt drematicly increasing and gives best data to see what method is best

<https://heartbeat.fritz.ai/5-regression-loss-functions-all-machine-learners-should-know-4fb140e9d4b0> Edited Loss functions to Mean Squared Error (insted of using catagorical type of loss function) SGD seams to be used with Regression loss insted of catagorical loss so giving it a shot as this is outputing numbers and not yes and no