The Project

Purpose and Scope

A project is an exploration of an issue or concept or phenomenon we have encountered in our study of ANNs. Crucially, the project is constrained by converting or interpreting the topic into a **specific, testable proposal** (often expressed as a hypothesis). Often the idea is tested in a very simplified or essential form. We are not trying to make functional ML applications for real world problems – projects might explore the mechanism, limitations, possibilities, and exploitable features of ANNs. Alternatively, ANNs might be applied to different problems (i.e. different data sets) to gain some insight into the nature of the data. Projects don't have to solve problems (or even work as intended) but should explore issues and allow some conclusions about them. This is why constructing an interesting, valid, and testable hypothesis is a good assurance that you have a good project.

The other thing you will need is a suitable data set. If you're not using MNIST data, there are many other datasets available (see Kaggle site for example), - in some cases it's possible to make your own data (with your pyth

Most student projects fal an investigation into what is present in the dat it learnable etc.). Some projects are lookin can be used with different classification pr

Scope

The project must be base udying. You can compare with other mod ct based within a different programming er

Unless you have an excep

- Use the mnist dat

OR

- use the standard ANN (i.e. Tariq's - or some variant of it that you implement)

OR

- both of the above.

You can use advanced python libraries as appropriate, but, fundamentally, you need to understand what the parts of your program are doing (and how): I want to assess (among other things) how well you grasp how an ANN implements learning and how this is achieved in Python code.

Examples of the titles of projects that students have done in the past:

- Can an ANN learn to count?
- What are hidden nodes looking for?

- What can't the ANN learn and why?
- How good is a simple ANN at learning textures?
- Do ANN and t-SNE make the same errors with MNSIT classification?
- Is learning more sensitive to degraded images or degraded networks?
- What, if any, information in the training data is irrelevant for learning?
- Can neural networks accurately identify the number of dots in an image?
- Can the weight matrices for good and poor learners be distinguished visually?
- How adaptable is an ANN in response to a foreign input in the MNIST dataset?
- How would learning MNIST test images be improved by expanding the training data?
- Are critical periods in learning inherent to, or an extension to, the neural network model?
- How important is the degree of randomisation in the training data for learning performance?
- Can simple changes to MNIST training and test data, such as luminance and contrast, affect learning?
- Artificial Neural Networks That Learn Curve Patterns
- The Effect of Training Sequence on Network Performance
- The Inner Depictions of Numbers in an Artificial Neural Net (ANN)
- Compression of MNIST datasets using autoencoder pre- processing
- Image Distortion and its Effect on the Accuracy of Neural Networks
- A novel data poolin
- An exploration of re gical deficits
- Investigation of the ural network
- Corrupting the test: storted data
- The interactions be tion function choice
- Capability of Artifici ght Handwritten Digits
- Insights into the na mple three-layers ANN model
- The effect of rotatic artificial neural network
- Comparing Latin an arning performance
- Investigating the Ap Research: A Focus on Lipophilicity Predict
- The effect of rando ase on nonconvolutional n
- Utilising the comple nd decision trees in the context of MNIST di

Word Limit

The report size, of 3,000 words, is a guide to the scope of the report. It may be that your report can be well-described in less than 3000 words, or it is possible that 3000 words isn't enough to provided all of the information that needs to be conveyed. In such cases there is no need to be concerned about exceeding or not meeting the word limit. However, reports that are overly wordy, discursive, repetitive, or contain extraneous information, could attract mark penalties – regardless of the number word used. Similarly, reports that are below the recommended limit and seem to omit information that would be germane to explaining aspects of the study would be penalised.

Format

Although there is no prescribed format, and different topics may be suited to different formats, there are a number of features a report should have, and, typically, these are arranged in the following way:

The main subject of the report, which is identified in the report's title, needs to be placed in the relevant context. This "Introduction" section starts by explaining the broad context of the question you are examining in your project, and breaks this issue or problem or question down into the specific question you examine. There should be a logical connection between the broad question and the reason you have chosen to do what you did in your project.

You must described what you did and how. You should append your code, and data (whatever it is that you created for and with the project), probably as an appendix, but you also need to explain it. You should use markdown cells in the program to explain what the code cells are doing and why (and the usual # comments for specific bits of code – esp. if they are not standard or common).

Results: it's likely that projects will generate quantitative data, so plots and tables should be used. Matplotlib has a huge number of options. Graphs and tables should be accompanied by legends and explanatory text – it' tand alone" but to both be included in the re

Discussion of the results a t – you need to show insight into what you hav n't oversell, but don't be unimaginative ir oor discussion section is a recapitulation tead, try and link the findings back to the ques rt.

I would not expect a lot o omething that is well know in ML and you do n ve have explored in the subject can be assum example, you don't need to explain what ML learning rate is, or an activation function, or ba

How will it be assessed?

While all of the points above are important in terms of determining the mark for your project, a key overall consideration is the degree of insight you evince in respect to the value, validity, and feasibility of the question you pose, the appropriateness (and limitations) of the way you investigated it, and the value of the outcome (in terms of addressing your question and any further implications).

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