

Exercise 19 - DNN Further Investigations

March 12, 2018

1. Repeating same model as in dataset v1 but with 2 extra weeks of data:

1.1 Predicting ETH with exogenous BTC

Accuracy (average of 3 chunks - 3 weeks): 0.55

Accuracy (confidence intervals of 55%): 0.62 (177 predicted of 322)

1.2 Predicting DASH with exogenous BTC

Accuracy (average of 3 chunks - 3 weeks): 0.56

Accuracy (confidence intervals of 55%): 0.61 (524 predicted of 1090)

2. Attempting multiple hidden layers

2.1 Predicting ETH with exogenous BTC

| | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 | V9 | V10 | V11 | V12 | V13 | V14 | V15 | V16 | V17 | V18 | V19 | V20 |
|----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | 0.4949153 | 0.5389830 | 0.4949153 | 0.5457627 | 0.5711864 | 0.5203390 | 0.5440678 | 0.5033898 | 0.5779661 | 0.5813559 | 0.5661017 | 0.5593220 | 0.5457627 | 0.5254237 | 0.5135593 | 0.5322034 | 0.5457627 | 0.5559322 | 0.5508475 | 0.5491525 |
| 2 | 0.5576271 | 0.4949153 | 0.5237288 | 0.5050847 | 0.5576271 | 0.5559322 | 0.5305085 | 0.5000000 | 0.5372881 | 0.5152542 | 0.5016949 | 0.5338983 | 0.5152543 | 0.5474576 | 0.5508474 | 0.5491526 | 0.5542373 | 0.5169492 | 0.5271186 | 0.5254237 |
| 3 | 0.5610170 | 0.5254237 | 0.5508475 | 0.5525424 | 0.5559322 | 0.5355932 | 0.4830508 | 0.5542373 | 0.5135593 | 0.5423729 | 0.5084746 | 0.5491525 | 0.5016949 | 0.4966102 | 0.5118644 | 0.5610169 | 0.5474576 | 0.5728813 | 0.5135593 | 0.5271186 |
| 4 | 0.5508475 | 0.5186441 | 0.5237288 | 0.5305085 | 0.5169492 | 0.5508475 | 0.5169492 | 0.5779661 | 0.5254237 | 0.5305085 | 0.5559322 | 0.5593220 | 0.5322034 | 0.5389830 | 0.5254237 | 0.5322034 | 0.5338983 | 0.5457627 | 0.5423729 | 0.5423729 |
| 5 | 0.5322034 | 0.5728814 | 0.5389830 | 0.5457627 | 0.5372881 | 0.4966102 | 0.5322034 | 0.5474576 | 0.5305085 | 0.5271186 | 0.5677966 | 0.5254237 | 0.5237288 | 0.5542373 | 0.5372881 | 0.5254237 | 0.5661017 | 0.5830509 | 0.5661017 | 0.5677966 |
| 6 | 0.5186441 | 0.5305085 | 0.4864407 | 0.5389830 | 0.5508475 | 0.5254237 | 0.5305085 | 0.5694915 | 0.5491525 | 0.5406780 | 0.5491525 | 0.5423729 | 0.5050848 | 0.5000000 | 0.5627119 | 0.5389831 | 0.5457627 | 0.5508475 | 0.5186441 | 0.5440678 |
| 7 | 0.5152542 | 0.5508474 | 0.5389831 | 0.5508475 | 0.5644068 | 0.5457627 | 0.5101695 | 0.5576271 | 0.5406780 | 0.5508475 | 0.5576271 | 0.5305085 | 0.5372881 | 0.5389831 | 0.5288136 | 0.5593220 | 0.4966102 | 0.5322034 | 0.5338983 | 0.5559322 |
| 8 | 0.5389831 | 0.5491525 | 0.5627119 | 0.5508475 | 0.5406780 | 0.5423729 | 0.5677966 | 0.5372881 | 0.5576271 | 0.5254237 | 0.5694915 | 0.5288135 | 0.5711864 | 0.5813559 | 0.5542373 | 0.5186441 | 0.5508475 | 0.5542373 | 0.5661017 | 0.5644068 |
| 9 | 0.5237288 | 0.5542373 | 0.5084746 | 0.5288136 | 0.5338983 | 0.5322034 | 0.4966102 | 0.5372881 | 0.5406780 | 0.5220339 | 0.5084746 | 0.5101695 | 0.5152542 | 0.5474576 | 0.5271186 | 0.5457627 | 0.5474576 | 0.5372881 | 0.5288135 | 0.5593220 |
| 10 | 0.5135593 | 0.4983051 | 0.5694915 | 0.5389831 | 0.5661017 | 0.5542373 | 0.5694915 | 0.5389830 | 0.5644068 | 0.5542373 | 0.5610170 | 0.5559322 | 0.5491526 | 0.5593221 | 0.5050848 | 0.5593221 | 0.5254237 | 0.5254237 | 0.5457627 | 0.5389830 |
| 11 | 0.5389831 | 0.5389830 | 0.5101695 | 0.5576271 | 0.5542373 | 0.5440678 | 0.5457627 | 0.5457627 | 0.5610170 | 0.5220339 | 0.5508475 | 0.5203390 | 0.5728814 | 0.5474576 | 0.5542373 | 0.5372882 | 0.5423729 | 0.5525424 | 0.5322034 | 0.5440678 |
| 12 | 0.5474576 | 0.5474576 | 0.5542373 | 0.5338983 | 0.5457627 | 0.5322034 | 0.5305085 | 0.5237288 | 0.5508475 | 0.5508475 | 0.5423729 | 0.5322034 | 0.5457627 | 0.5576271 | 0.5423729 | 0.5169491 | 0.5677966 | 0.5474576 | 0.5491525 | 0.5220339 |
| 13 | 0.5491526 | 0.5474576 | 0.5474576 | 0.5576271 | 0.5457627 | 0.5508474 | 0.5389830 | 0.5542373 | 0.5305085 | 0.5610169 | 0.5423729 | 0.5271186 | 0.5372881 | 0.5440678 | 0.5440678 | 0.5576271 | 0.5644068 | 0.5389831 | 0.5338983 | 0.5491525 |
| 14 | 0.5305085 | 0.5372881 | 0.5762712 | 0.5440678 | 0.5355932 | 0.5220339 | 0.5508475 | 0.5254237 | 0.5050848 | 0.5576271 | 0.5389830 | 0.5186441 | 0.5508475 | 0.5457627 | 0.5423729 | 0.5542373 | 0.5593220 | 0.5677966 | 0.5135593 | 0.5169492 |
| 15 | 0.5067797 | 0.5355932 | 0.5389830 | 0.5389830 | 0.5288136 | 0.5406780 | 0.5355932 | 0.5169491 | 0.5576271 | 0.5101695 | 0.5576271 | 0.5474576 | 0.5644068 | 0.5372881 | 0.5220339 | 0.5305085 | 0.5355932 | 0.5457627 | 0.5627119 | 0.5305085 |
| 16 | 0.5779661 | 0.5423729 | 0.5508475 | 0.5644068 | 0.5474576 | 0.5288136 | 0.5440678 | 0.5644068 | 0.5237288 | 0.5355932 | 0.5033898 | 0.5694915 | 0.5322034 | 0.5474576 | 0.5508475 | 0.5542373 | 0.5474576 | 0.5457627 | 0.5338983 | 0.5576271 |
| 17 | 0.5186441 | 0.5237288 | 0.5508475 | 0.5644068 | 0.5101695 | 0.5508475 | 0.5559322 | 0.5610170 | 0.5440678 | 0.4932203 | 0.5542373 | 0.5389830 | 0.5372881 | 0.5711864 | 0.5322034 | 0.5542373 | 0.5491525 | 0.5559322 | 0.5186441 | 0.5237288 |
| 18 | 0.5288136 | 0.5559322 | 0.5508475 | 0.5305085 | 0.5644068 | 0.5474576 | 0.5440678 | 0.5559322 | 0.5338983 | 0.5542373 | 0.5474576 | 0.5457627 | 0.5169492 | 0.5694915 | 0.5491525 | 0.5220339 | 0.5508474 | 0.4966102 | 0.5525424 | 0.5813559 |
| 19 | 0.5542373 | 0.5728813 | 0.5457627 | 0.5576271 | 0.5118644 | 0.5203390 | 0.5711865 | 0.5186441 | 0.5254237 | 0.5372881 | 0.5491525 | 0.5067796 | 0.5271187 | 0.5457627 | 0.5593220 | 0.5440678 | 0.5169492 | 0.5186441 | 0.5745763 | 0.5406780 |
| 20 | 0.5542373 | 0.5406780 | 0.5220339 | 0.5525424 | 0.5610169 | 0.5152542 | 0.5271186 | 0.5457627 | 0.5389830 | 0.5254237 | 0.5576271 | 0.5542373 | 0.5237288 | 0.5457627 | 0.5593220 | 0.5406780 | 0.5508475 | 0.5559322 | 0.5440678 | 0.5474576 |

2.2 Predicting DASH with exogenous BTC

| | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 | V9 | V10 | V11 | V12 | V13 | V14 | V15 | V16 | V17 | V18 | V19 | V20 |
|----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1 | 0.520339 | 0.516949 | 0.520339 | 0.486441 | 0.520339 | 0.532203 | 0.523729 | 0.542373 | 0.515254 | 0.523729 | 0.523729 | 0.508475 | 0.549153 | 0.561017 | 0.532203 | 0.550847 | 0.525424 | 0.542373 | 0.520339 | 0.518644 |
| 2 | 0.535593 | 0.505085 | 0.530508 | 0.528814 | 0.554237 | 0.544068 | 0.511864 | 0.525424 | 0.508475 | 0.547458 | 0.527119 | 0.528814 | 0.535593 | 0.545763 | 0.522034 | 0.566102 | 0.528814 | 0.522034 | 0.515254 | 0.513559 |
| 3 | 0.520339 | 0.515254 | 0.488136 | 0.544068 | 0.498305 | 0.523729 | 0.533898 | 0.522034 | 0.528814 | 0.528814 | 0.522034 | 0.528814 | 0.515254 | 0.513559 | 0.516949 | 0.542373 | 0.549153 | 0.527119 | 0.486441 | 0.538983 |
| 4 | 0.518644 | 0.533898 | 0.508475 | 0.538983 | 0.540678 | 0.508475 | 0.511864 | 0.532203 | 0.544068 | 0.538983 | 0.520339 | 0.576271 | 0.554237 | 0.486441 | 0.501695 | 0.520339 | 0.50678 | 0.535593 | 0.532203 | 0.515254 |
| 5 | 0.530508 | 0.537288 | 0.537288 | 0.49322 | 0.549153 | 0.522034 | 0.520339 | 0.547458 | 0.550847 | 0.510169 | 0.527119 | 0.540678 | 0.525424 | 0.484746 | 0.513559 | 0.532203 | 0.510169 | 0.533898 | 0.513559 | 0.510169 |
| 6 | 0.532203 | 0.474576 | 0.542373 | 0.538983 | 0.540678 | 0.538983 | 0.510169 | 0.561017 | 0.494915 | 0.516949 | 0.554237 | 0.511864 | 0.489831 | 0.540678 | 0.484746 | 0.533898 | 0.511864 | 0.545763 | 0.530508 | 0.528814 |
| 7 | 0.518644 | 0.50678 | 0.50678 | 0.520339 | 0.525424 | 0.544068 | 0.566102 | 0.516949 | 0.530508 | 0.564407 | 0.513559 | 0.532203 | 0.533898 | 0.501695 | 0.533898 | 0.530508 | 0.532203 | 0.532203 | 0.5 | 0.542373 |
| 8 | 0.527119 | 0.505085 | 0.518644 | 0.561017 | 0.513559 | 0.537288 | 0.530508 | 0.515254 | 0.535593 | 0.555932 | 0.528814 | 0.538983 | 0.520339 | 0.528814 | 0.522034 | 0.527119 | 0.501695 | 0.544068 | 0.527119 | 0.522034 |
| 9 | 0.50339 | 0.491525 | 0.542373 | 0.510169 | 0.522034 | 0.544068 | 0.510169 | 0.561017 | 0.484746 | 0.550847 | 0.557627 | 0.522034 | 0.538983 | 0.545763 | 0.530508 | 0.530508 | 0.523729 | 0.528814 | 0.561017 | 0.525424 |
| 10 | 0.523729 | 0.527119 | 0.533898 | 0.535593 | 0.522034 | 0.474576 | 0.522034 | 0.513559 | 0.527119 | 0.510169 | 0.538983 | 0.518644 | 0.513559 | 0.527119 | 0.540678 | 0.518644 | 0.533898 | 0.49661 | 0.564407 | 0.525424 |
| 11 | 0.527119 | 0.528814 | 0.508475 | 0.528814 | 0.511864 | 0.505085 | 0.522034 | 0.483051 | 0.544068 | 0.518644 | 0.520339 | 0.513559 | 0.537288 | 0.494915 | 0.532203 | 0.525424 | 0.547458 | 0.520339 | 0.516949 | 0.542373 |
| 12 | 0.511864 | 0.49661 | 0.532203 | 0.510169 | 0.532203 | 0.525424 | 0.544068 | 0.527119 | 0.547458 | 0.491525 | 0.533898 | 0.525424 | 0.542373 | 0.533898 | 0.555932 | 0.513559 | 0.527119 | 0.513559 | 0.533898 | 0.510169 |
| 13 | 0.477966 | 0.537288 | 0.505085 | 0.510169 | 0.49322 | 0.522034 | 0.516949 | 0.511864 | 0.518644 | 0.523729 | 0.518644 | 0.527119 | 0.533898 | 0.535593 | 0.511864 | 0.520339 | 0.547458 | 0.491525 | 0.542373 | 0.49661 |
| 14 | 0.511864 | 0.537288 | 0.491525 | 0.525424 | 0.516949 | 0.49661 | 0.549153 | 0.515254 | 0.533898 | 0.554237 | 0.533898 | 0.508475 | 0.542373 | 0.535593 | 0.549153 | 0.528814 | 0.520339 | 0.518644 | 0.525424 | 0.508475 |
| 15 | 0.513559 | 0.535593 | 0.533898 | 0.511864 | 0.527119 | 0.525424 | 0.538983 | 0.511864 | 0.537288 | 0.523729 | 0.520339 | 0.510169 | 0.523729 | 0.513559 | 0.544068 | 0.530508 | 0.532203 | 0.530508 | 0.50339 | 0.522034 |
| 16 | 0.477966 | 0.533898 | 0.516949 | 0.50678 | 0.525424 | 0.535593 | 0.523729 | 0.542373 | 0.508475 | 0.520339 | 0.532203 | 0.515254 | 0.555932 | 0.532203 | 0.538983 | 0.530508 | 0.550847 | 0.549153 | 0.547458 | 0.527119 |
| 17 | 0.518644 | 0.511864 | 0.505085 | 0.520339 | 0.522034 | 0.538983 | 0.537288 | 0.522034 | 0.518644 | 0.50339 | 0.532203 | 0.562712 | 0.508475 | 0.520339 | 0.505085 | 0.511864 | 0.510169 | 0.550847 | 0.542373 | 0.538983 |
| 18 | 0.513559 | 0.516949 | 0.523729 | 0.559322 | 0.540678 | 0.532203 | 0.522034 | 0.50339 | 0.533898 | 0.522034 | 0.508475 | 0.528814 | 0.515254 | 0.535593 | 0.525424 | 0.532203 | 0.547458 | 0.518644 | 0.513559 | 0.515254 |
| 19 | 0.532203 | 0.532203 | 0.523729 | 0.538983 | 0.561017 | 0.528814 | 0.527119 | 0.537288 | 0.515254 | 0.511864 | 0.530508 | 0.528814 | 0.516949 | 0.530508 | 0.518644 | 0.494915 | 0.508475 | 0.520339 | 0.532203 | 0.527119 |
| 20 | 0.528814 | 0.518644 | 0.515254 | 0.520339 | 0.50339 | 0.515254 | 0.544068 | 0.511864 | 0.530508 | 0.545763 | 0.530508 | 0.533898 | 0.508475 | 0.515254 | 0.525424 | 0.518644 | 0.523729 | 0.544068 | 0.511864 | 0.545763 |

Figure 2 - performance object for various DNN architectures (run time ~24hrs)

DNN Architecture performance

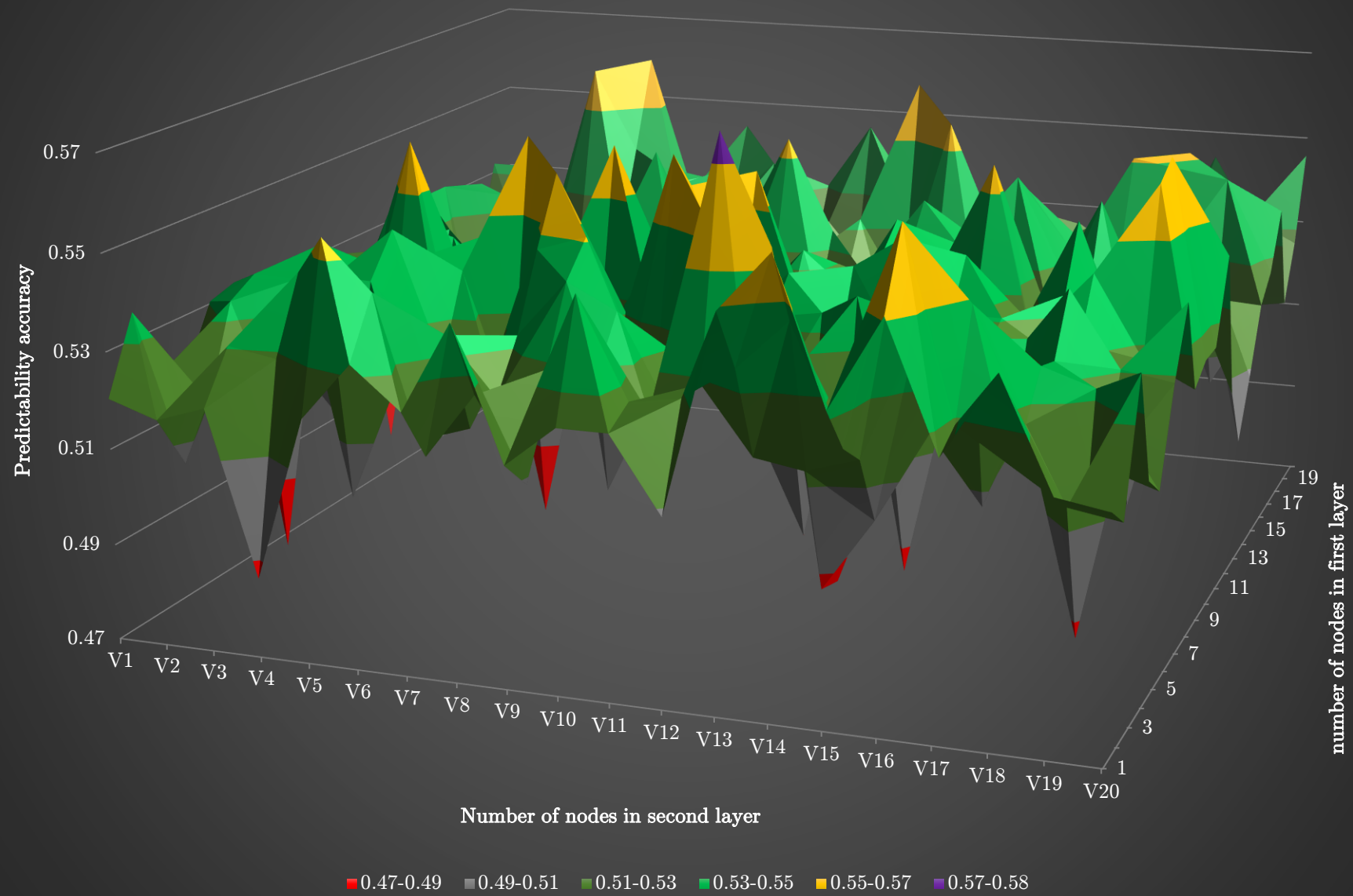


Figure 2 - 3D plot of various DNN architecture performance