Results

By default networks trained with:

```
batch_size=25,
epochs=200,
act=tanh
```

Decompositional (DeepRED) Rule Extraction

Dataset	NN Structure	Train	Test	NN Accuracy	NN Train Time (s)	Rules Extracted	Rule Accuracy	Rule Fidelity	Av Number Terms per rule	Rule Extraction Time (s)	Memory Usage (Mb)
Artif-1	5-10-5-2	24000	6000	100	228.87	4, 6	100	100	2.5	11.57	92.03
Artif-2	5-10-5-2	4000	1000	100	44.7	16, 42	94.2	94.2	4.60	6.10	47.55
BreastCancer	30-16-2-2	455	114	97.37	5.107	2, 2	89.47	90.35	1.5	0.665	9.93
LetterRecognition*	16-40-30-2	1262	316	97.15	16.10	**Times out on my machine**					
MNIST*	784-10-5-2	11824	2956	99.86	230.9	9, 6	99.996	99.76	2.53	126.1	1139.57
MB-ER	1000-100-50-2	1584	396	93.43	33.97	168, 40	94.7	94.2	5.55	120.85	311.53

*Working with binarized data (transform problem into a binary classification task)

Pedagogical Baseline

Dataset	Rules Extracted	Rule Accuracy	Rule Fidelity	Av Number Terms per rule	Rule Extraction Time (s)	Memory Usage (Mb)
Artif-1	5, 5	100	100	2.6	0.853	25.33
Artif-2	6, 4	100	100	2.8	0.25	0.74
BreastCancer	5, 6	93.86	96.49	2.27	0.24	1.11
LetterRecognition	10, 6	95.57	93.4	3	0.55	2.09
MNIST	8, 6	99.696	99.763	2.57	32.2	575.6
MB-ER	10, 9	91.41	92.42	3.05	13.69	204.8

(Extra MNIST Tests just to see what happens?)

```
MNIST with [784, 20, 10, 2]

--- Rule Extraction took 132.1210401058197 seconds and used 1202.93359375 Mb to execute --
-
Accuracy:  0.9979702300405954
Fidelity:  0.9983085250338295
```

```
Comprehensibility:
    Class:  Zero | n_rules: 9 | number of terms: min: 1 max: 3 average: 2.000000 |
    Class:  One | n_rules: 5 | number of terms: min: 1 max: 4 average: 3.200000 |
  Overall average n_terms per rule:  2.4285714285714284
--------------------------------------------------------------------------------
------------
MNIST with [784, 30, 20, 10, 2]

--- Rule Extraction took 144.0135440826416 seconds and used 1299.97265625 Mb to execute --
-
Accuracy:  0.996617050067659
Fidelity:  0.9969553450608931
Comprehensibility:
    Class:  Zero | n_rules: 6 | number of terms: min: 2 max: 3 average: 2.333333 |
    Class:  One | n_rules: 4 | number of terms: min: 2 max: 3 average: 2.500000 |
  Overall average n_terms per rule:  2.4
```