

Question 2: Multilayer Perceptron 1

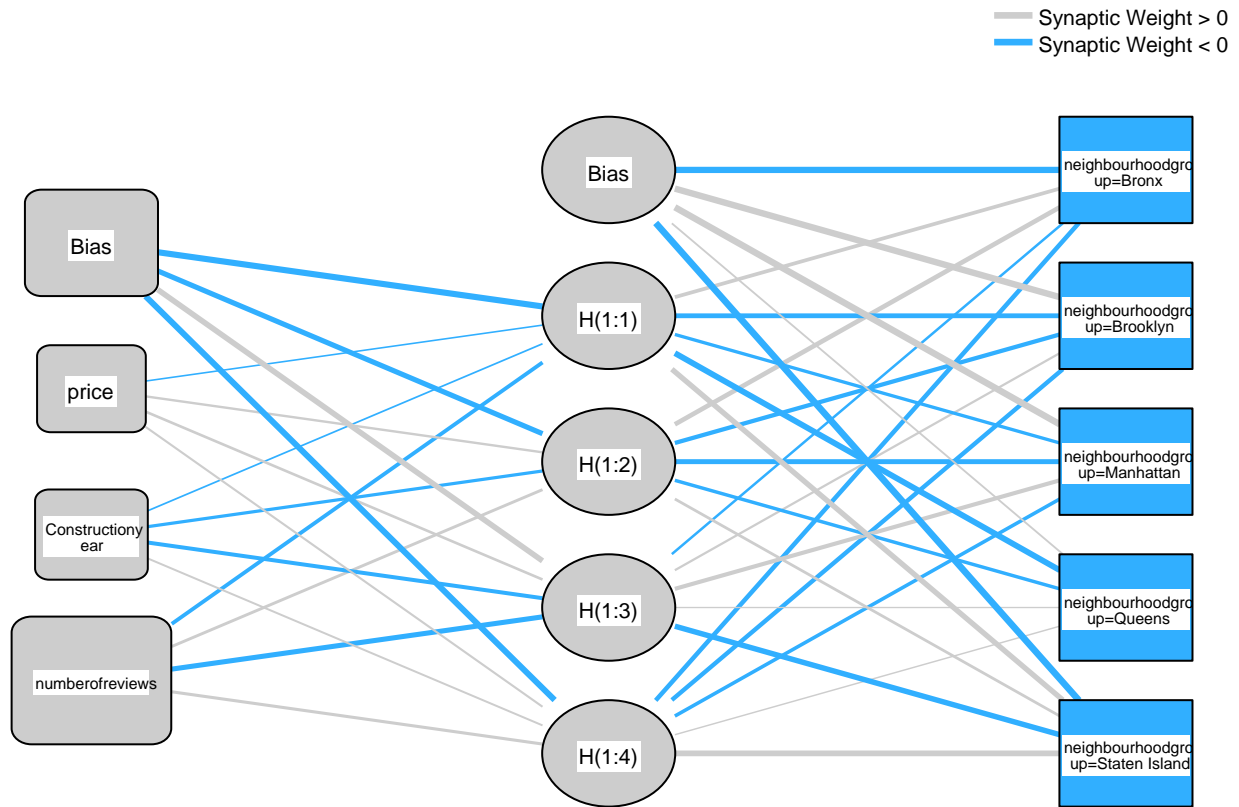
Case Processing Summary

| | | N | Percent |
|----------|----------|-------|---------|
| Sample | Training | 69227 | 69.9% |
| | Testing | 29748 | 30.1% |
| Valid | | 98975 | 100.0% |
| Excluded | | 731 | |
| Total | | 99706 | |

Network Information

| | | | |
|-----------------|--|---|---------------------|
| Input Layer | Covariates | 1 | price |
| | | 2 | Constructionyear |
| | | 3 | numberofreviews |
| | Number of Units ^a | | 3 |
| | Rescaling Method for Covariates | | Standardized |
| Hidden Layer(s) | Number of Hidden Layers | | 1 |
| | Number of Units in Hidden Layer 1 ^a | | 4 |
| | Activation Function | | Hyperbolic tangent |
| Output Layer | Dependent Variables | 1 | neighbourhood group |
| | Number of Units | | 5 |
| | Activation Function | | Softmax |
| | Error Function | | Cross-entropy |

a. Excluding the bias unit



Hidden layer activation function: Hyperbolic tangent

Output layer activation function: Softmax

Model Summary

| | | |
|----------|-------------------------------|--|
| Training | Cross Entropy Error | 78183.574 |
| | Percent Incorrect Predictions | 55.9% |
| | Stopping Rule Used | Relative change in training error criterion (.0001) achieved |
| | Training Time | 0:00:00.29 |
| Testing | Cross Entropy Error | 33660.871 |
| | Percent Incorrect Predictions | 55.9% |

Dependent Variable: neighbourhoodgroup

Parameter Estimates

| Predictor | | Hidden Layer 1 | | | | Output Layer |
|----------------|------------------|----------------|--------|--------|--------|---------------------|
| | | H(1:1) | H(1:2) | H(1:3) | H(1:4) | [neighbourhood] |
| Input Layer | (Bias) | -.768 | -.530 | .568 | -.755 | |
| | price | -.033 | .104 | .119 | .062 | |
| | Constructionyear | -.049 | -.157 | -.286 | .061 | |
| | numberofreviews | -.262 | .147 | -.523 | .150 | |
| Hidden Layer 1 | (Bias) | | | | | -.889 |
| | H(1:1) | | | | | .257 |
| | H(1:2) | | | | | .380 |
| | H(1:3) | | | | | -.105 |
| | H(1:4) | | | | | -.353 |

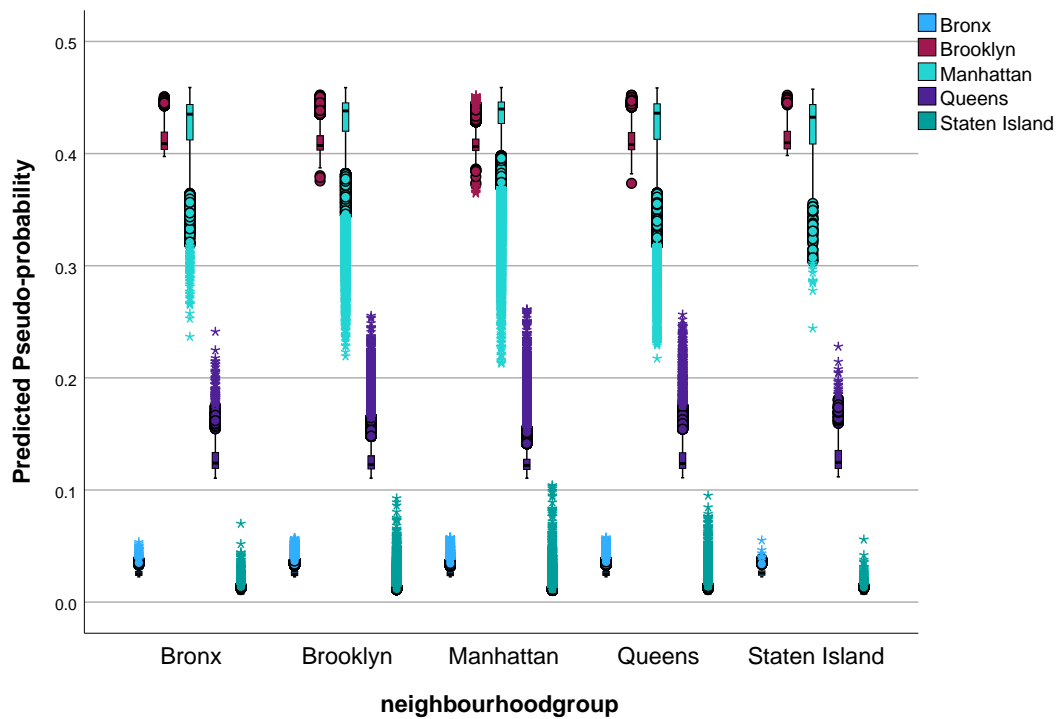
Parameter Estimates

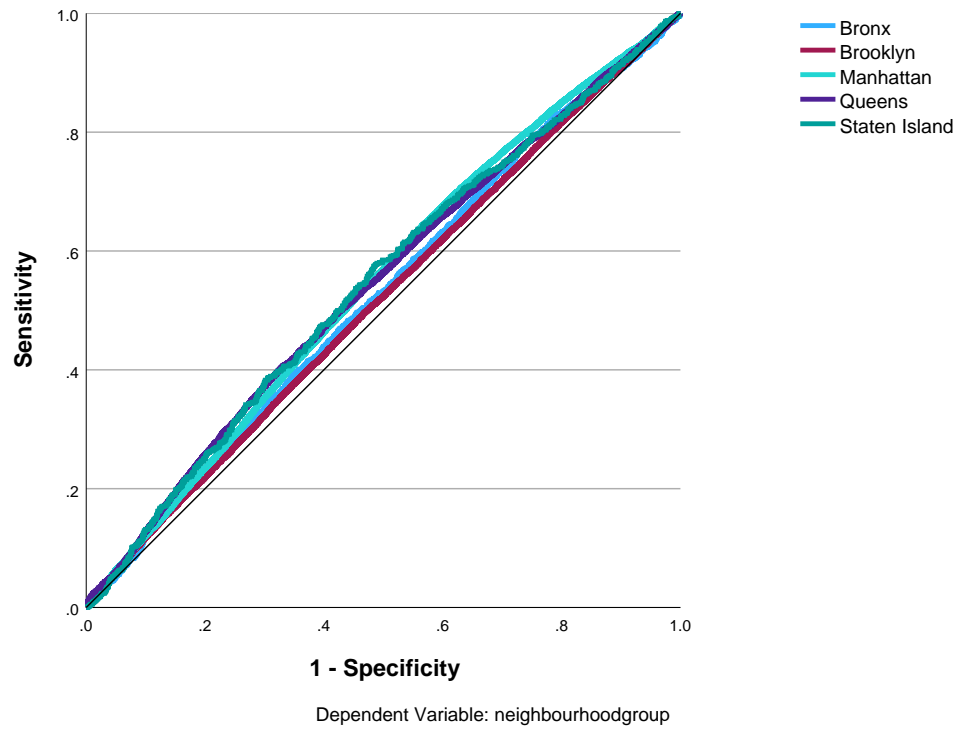
| Predictor | | Output Layer | | | |
|----------------|------------------|-----------------------------|---------------------------------------|---------------------|-------------------------------------|
| | | [neighbourhood land] | [neighbourhood group=Manhatta] | [neighbourhood] | [neighbourhood group=Staten] |
| Input Layer | (Bias) | | | | |
| | price | | | | |
| | Constructionyear | | | | |
| | numberofreviews | | | | |
| Hidden Layer 1 | (Bias) | 1.050 | 1.123 | .061 | -1.136 |
| | H(1:1) | -.466 | -.180 | -.630 | .539 |
| | H(1:2) | -.301 | -.505 | -.207 | .132 |
| | H(1:3) | .078 | .290 | .010 | -.560 |
| | H(1:4) | -.313 | -.222 | .026 | .578 |

Classification

| Sample | Observed | Predicted | | | | | Percent Correct |
|----------|-----------------|-----------|----------|-----------|--------|---------------|-----------------|
| | | Bronx | Brooklyn | Manhattan | Queens | Staten Island | |
| Training | Bronx | 0 | 511 | 1300 | 0 | 0 | 0.0% |
| | Brooklyn | 0 | 6566 | 21753 | 0 | 0 | 23.2% |
| | Manhattan | 0 | 5573 | 23950 | 0 | 0 | 81.1% |
| | Queens | 0 | 2463 | 6472 | 0 | 0 | 0.0% |
| | Staten Island | 0 | 200 | 439 | 0 | 0 | 0.0% |
| | Overall Percent | 0.0% | 22.1% | 77.9% | 0.0% | 0.0% | 44.1% |
| Testing | Bronx | 0 | 202 | 575 | 0 | 0 | 0.0% |
| | Brooklyn | 0 | 2840 | 9265 | 0 | 0 | 23.5% |
| | Manhattan | 0 | 2458 | 10283 | 0 | 0 | 80.7% |
| | Queens | 0 | 1018 | 2826 | 0 | 0 | 0.0% |
| | Staten Island | 0 | 77 | 204 | 0 | 0 | 0.0% |
| | Overall Percent | 0.0% | 22.2% | 77.8% | 0.0% | 0.0% | 44.1% |

Dependent Variable: neighbourhoodgroup





Area Under the Curve

| | | Area |
|--------------------|---------------|------|
| neighbourhoodgroup | Bronx | .526 |
| | Brooklyn | .518 |
| | Manhattan | .546 |
| | Queens | .544 |
| | Staten Island | .546 |

Independent Variable Importance

| | Importance | Normalized Importance |
|------------------|------------|-----------------------|
| price | .037 | 4.3% |
| Constructionyear | .102 | 11.8% |
| numberofreviews | .861 | 100.0% |

