I pieced together one attempt to develop a neural network back in 2012. The attached file contains the training records used to create a NN to try to predict if a nesting strategy (profile nesting) would win or lose vs. two other nesting strategies (pattern/fill and rectangular optimization). While the effort failed, you can at least see the features used. Here is a brief description of the features:

|  |  |
| --- | --- |
| **Name** | **Description** |
| <size>-avg\_ext\_prof\_ratio | The ratio of exterior profile area to the region area for all parts in this category |
| <size>-avg\_part\_area\_ratio | The ratio of part area to region area for all parts in this category |
| <size>-area\_ratio | The ratio of the total area of parts in this category to the total area of all parts in the part set |
| <size>-fill\_area\_ratio1 | This measures how well parts in this category fit inside interiors or concavities of all parts in the part set |
| <size>-fill\_area\_ratio2 | This measures how well other parts fit inside of the interiors and concavities of the parts in this category |
| <size>-quantity\_ratio | The ratio of total quantity of all parts in this category to the total quantity of all parts in the part set |
| <size>-num\_parts | The total number of unique parts in this category |
| <size>-total\_part\_area | The total part area of parts in this category |
| <size>-total\_part\_qty | The total quantity of parts to be nested in this category |
| num\_categories | The number of part categories in the part set |
| categories | A bitmask of the categories in the part set (vs = 1, s = 10, m = 100, l = 1000, vl = 10000) |
| xdim | X dimension of the plate |
| ydim | Y dimension of the plate |
|  |  |
| **Nested results** | **These were the actual outcomes and were not used to try to predict outcomes** |
| profile\_np\_area | Total area of the nested parts placed by profile nesting |
| pattern\_np\_area | Total area of the nested parts placed by pattern/fill |
| block\_opt\_np\_area | Total area of the nested parts placed by rectangular optimization |
| profile\_pu\_area | Area of the plate region used by the nested parts for profile nesting |
| pattern\_pu\_area | Area of the plate region used by the nested parts for pattern/fill |
| block\_opt\_pu\_area | Area of the plate region used by the nested parts for rectangular optimization |
| profile\_result | Did profile nesting win or lose? |
| pattern\_result | Did pattern/fill win or lose? |
| block\_opt\_result | Did rectangular optimization win or lose? |

Notes:

* See section  7.3.3 if the IntelliNest document for more detailed descriptions of the part category characteristics
* <*size*> is one of the following:
  + vs - Very small (>100 parts per region)
  + s - Small (20-100 parts per region)
  + m - Medium (10-20 parts per region)
  + l - Large (2-10 parts per region)
  + vl - Very large (1 part per region)
* Plate used region is the length of the plate used by the full plate width
* The last nine fields represent actual outcomes and not features used to try to predict an outcome.
* We generated the training data by actually nesting randomly generated sets of parts using three automatic nesting strategies: profile nesting, pattern/fill and rectangular optimization.
* The number of training records used in different runs varied from 1900 to 3800. This was a relatively small number of records.
* There was a total of 49 features in the input.
* The goal of the NN was to predict if profile nesting would win vs. both pattern/fill and rectangular optimization.