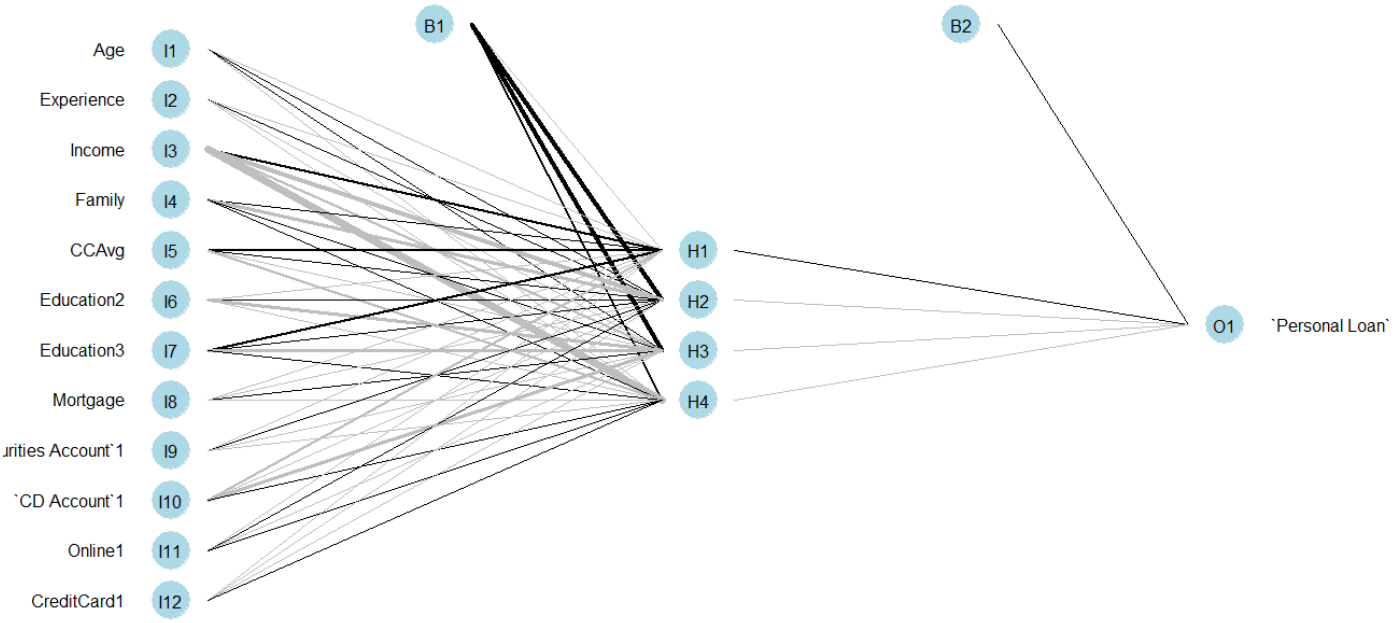
Neural Net based on Universal Bank data with 'Personal Loan' as the target

Reading the Neural Nets Plot



One of the downsides of neural nets is that it is hard to interpret the relevance or propensity of the inputs with respect to the output based on the plot. We can take a stab at it: It looks like customers who have high income, high average cc and have higher education borrow from Universal Bank (i.e. Take personal loan). We understand this by looking at the lines between the neural nodes. Black lines indicate that the categorical input is positive, and the intensity of the line indicated the weight of the input. The images show that the thick black lines leading to the intermediate neuron H1 is Income, CCAvg and Education3. The output of H1 neuron is the only positive input (black line) entering the final target Personal loan neuron.

We can also observe that customers that have a low income and no family (H2) do not borrow, even if the customer has higher education, CCAvg and mortgage. Even if a customer has experience, a family and a mortgage, those who do not have a CD Account with Universal bank, do not have intermediate or higher education and do not have high income(H3) do not borrow. Even if the customers have a family, higher education, mortgage, CD account and engage in online banking, they have a lower propensity to borrow if they have low Income (H4).

Comparing Neural Nets to Naïve Bayes

On comparing Naïve Bayes model with Neural Nets model, the sensitivity, specificity and error rates are much lower in neural nets (please check the code's comments for actual numbers). Naïve Bayes model's error is pretty close to the bench mark. This maybe because we are making assumptions that the independent variables are not correlated with each other, i.e. that they are mutually exclusive. We can't often use Naïve Bayes in real world scenarios because there can be many association relationships between the independent variables and the constraints with regards to Naïve Bayes assumptions are too restrictive.

On the other hand, neural nets are prone to overfitting. The combinations of inputs going into H1 – H4 in the intermediate layers are very specific. There are numerous ways to overcome overfitting, one of which is cross-validation. In this particular case, I would go for Neural nets instead of Naïve Bayes considering the cost-benefit.