

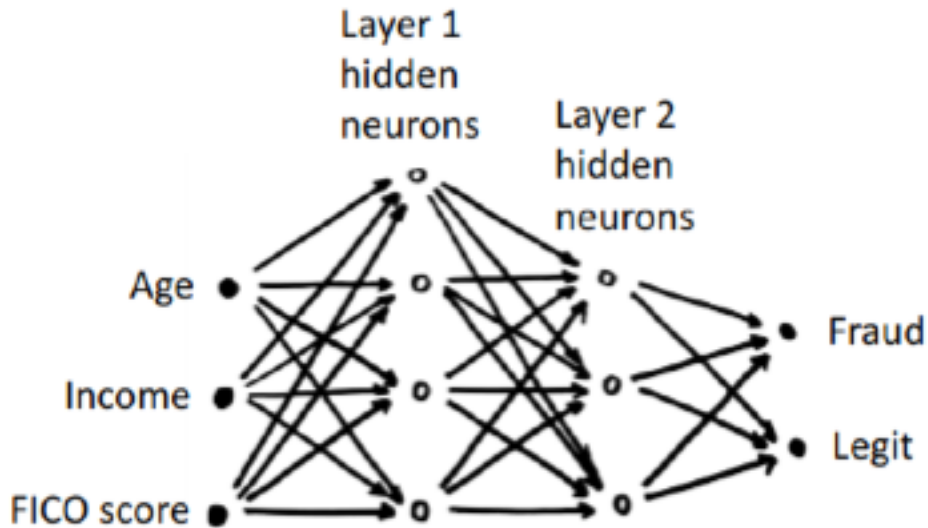






# Value of Deep Neural Networks

- Deep Learning learns a **hierarchy of non-linear transformations**
- Neurons transform their input in a non-linear way
- **Black-box, brute-force method, really good at pattern recognition**
- Deep Learning got a boost in the last decade due to **faster hardware and algorithmic advances**



**Deep Learning model**

**=**

**set of connecting weights**

**+**

**type of non-linearity**

# Pros and Cons of Deep Neural Networks

## Pros

- non linear
- robust to correlated features
- learned features can be extracted
- can stop training at any time
- can be fine-tuned with more data
- great ensemble member
- efficient for multi-class problems
- world-class at pattern recognition

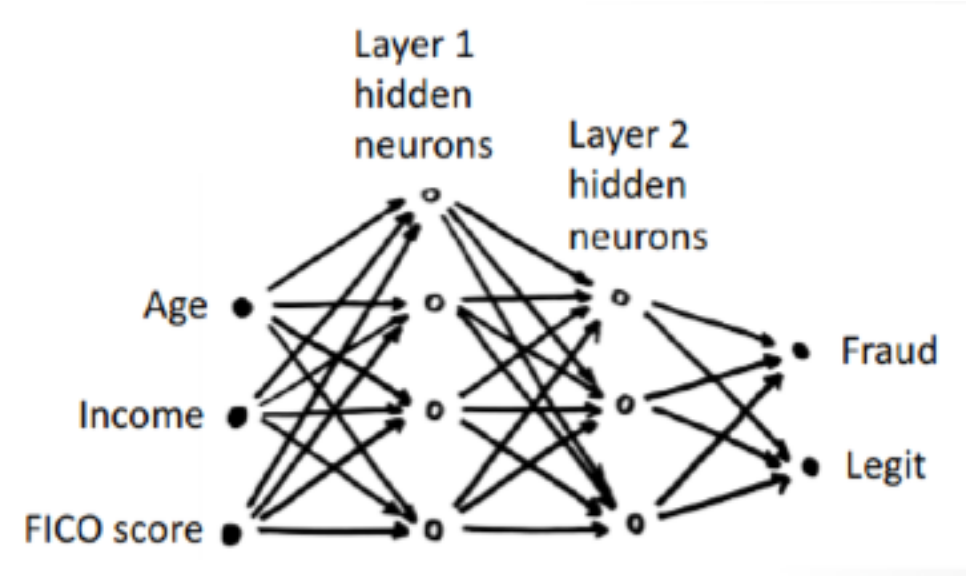
## Cons

- slow to train
- slow to score
- not interpretable
- results not fully reproducible
- theory not well understood
- overfits, needs regularization
- many hyper-parameters
- expands categorical variables
- must impute missing values



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