

# **Machine Learning Application on Petroleum Production Forecast**

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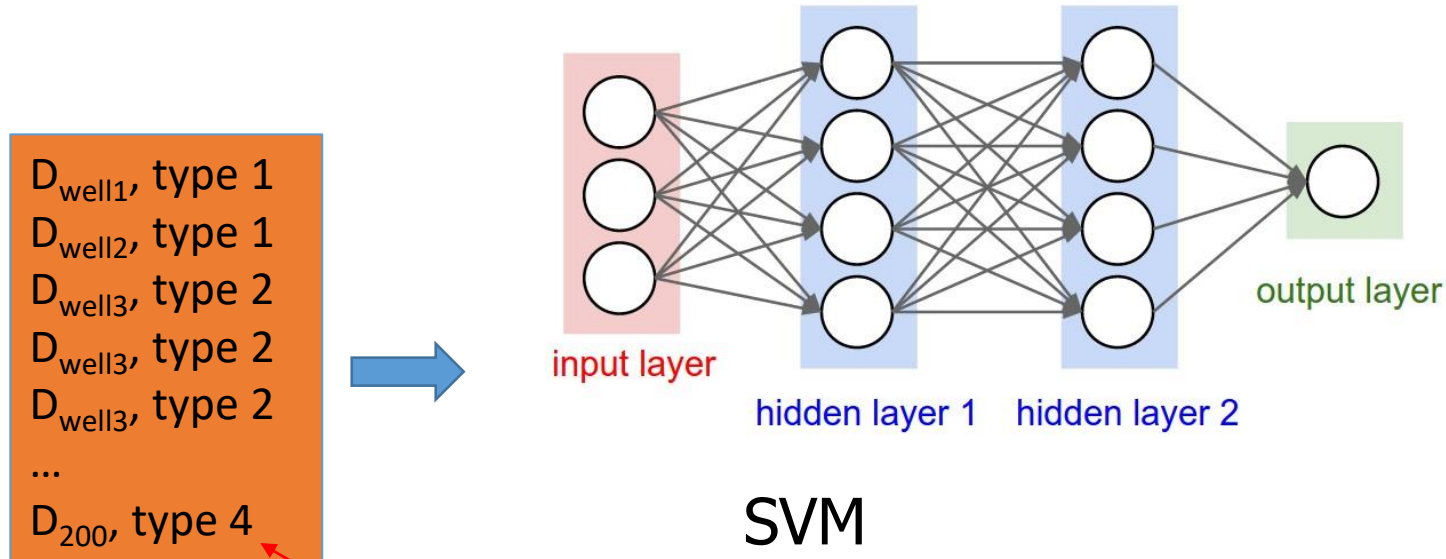
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# Machine Learning Algorithm

- SVM
- Neural Network
- Reason:
  - Multiple factors affecting production
  - Both could handle nonlinear relations: SVM is simple (kernel method), NNet is robust (hidden layer)
- Difference:
  - NNet use stochastic gradient descent(may not find optimal), SVM normally use sequential minimal optimization(more likely to find optimal)

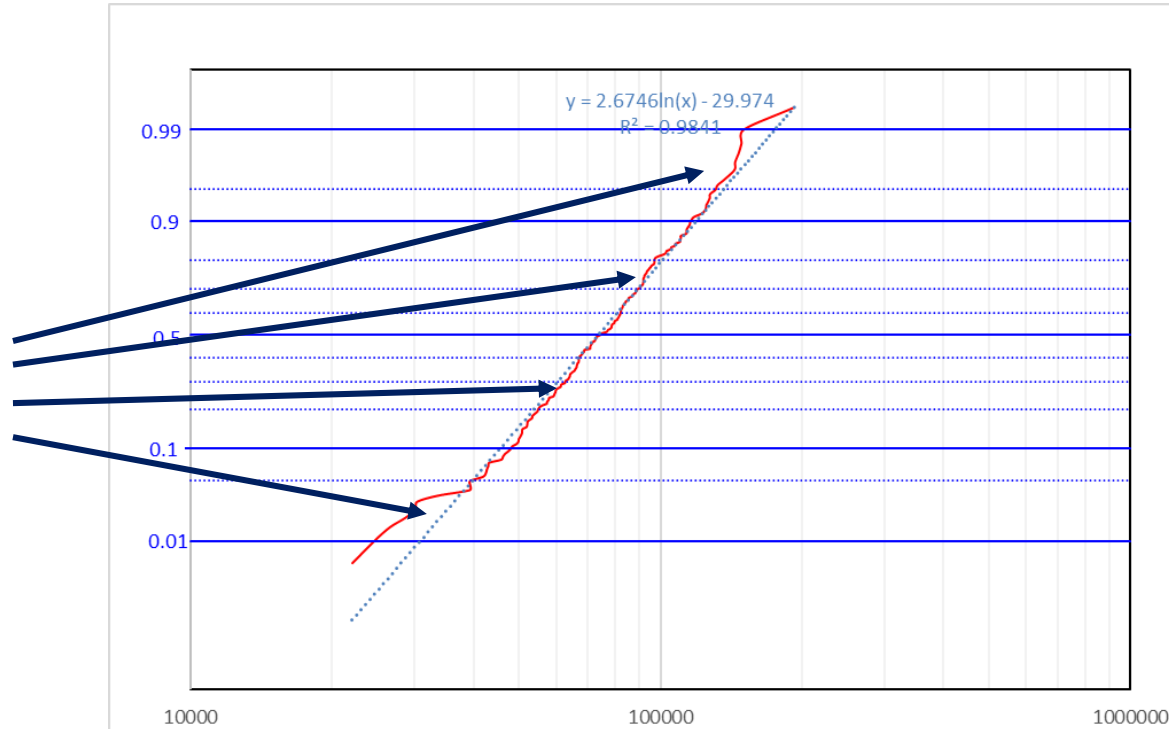
# Basic Idea: ML help as a robust classifier



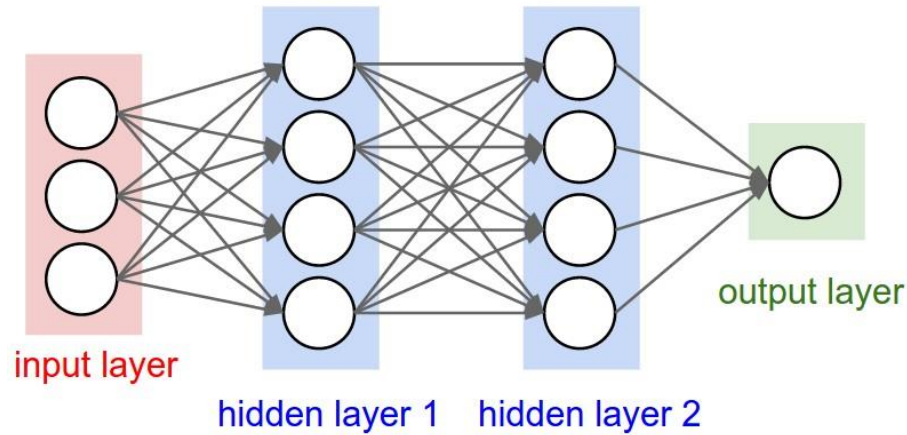
How do we get the class labels

- Early raw well production data
- Val Nav produces estimate ultimate recovery (EUR)
- Lognormal Probability plot gives P10, P50, P90 values
- 4 types – type wells

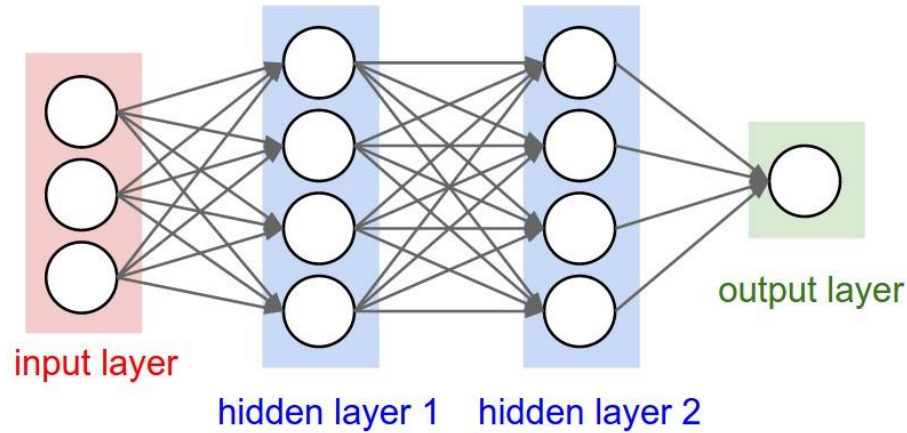
Each type  
corresponds to a  
EUR range



$D_{\text{well1}}$ , type 1  
 $D_{\text{well2}}$ , type 1  
 $D_{\text{well3}}$ , type 2  
 $D_{\text{well3}}$ , type 2  
 $D_{\text{well3}}$ , type 2  
...  
 $D_{200}$ , type 4



SVM



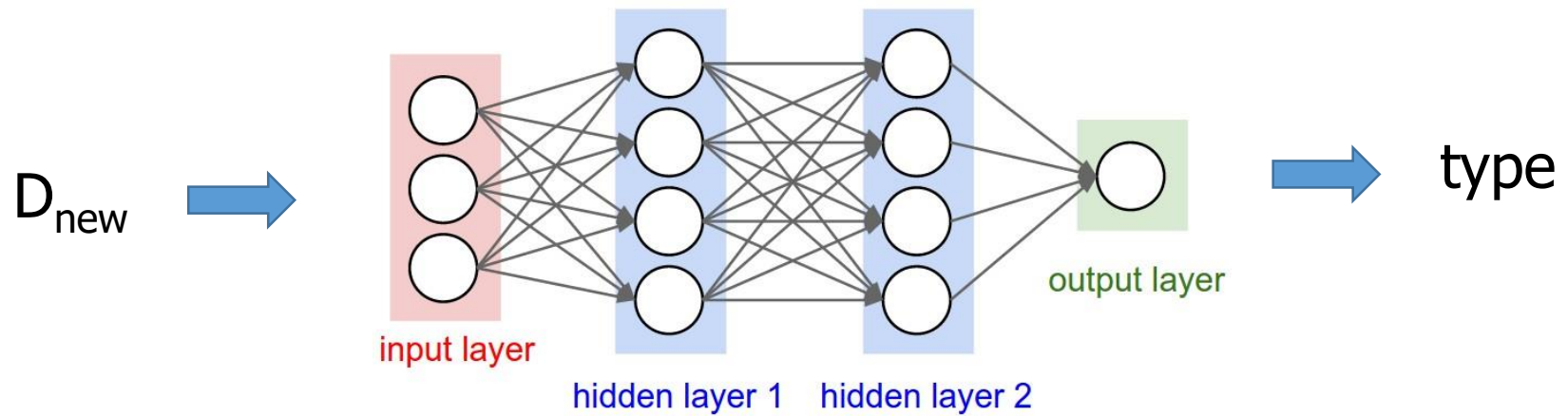
$D_{\text{new}}$



SVM



type



SVM

The classified type can be used to infer ultimate recovery  
Through the comparison of SVM and NNet, we get the  
better classifier for this specific problem

Q&A

