

# Improved Music Feature Learning with Deep Neural Networks

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- Try to learn the most optimal features for a particular task and reduce dependency on hand-crafted features.
- How can we learn features for a particular task?:  
Neural nets with several hidden layers (deep networks) provide a way to learn features for a particular task.
- Can we learn features for MIR tasks with neural nets?:  
Lots of recent evidence suggests yes!  
Neural nets have been used to successfully learn features for genre classification (Hamel,Sander), Music Transcription, Emotion prediction, music prediction etc.

## Optimisation

- Training neural networks with several hidden layers is challenging.
- The optimisation problem is highly non-linear and the best we can do is hope to find a useful local minimum.
- Unsupervised pre-training helps optimisation by finding a good initial parameter set.
- The number of hyper-parameters can be quite large if we include momentum, learning rate schedules etc.

# Current State of the Art

- The use of neural networks for supervised learning has come full circle in some ways.
- Unsupervised pre-training is not considered to be necessary for finding good solutions.
- Gradient based optimisers starting with random parameter initialisation provide good results.
- Rectified linear units, Dropout, Hessian Free optimisation, Nesterov's accelerated gradient have all been applied successfully to various problems.

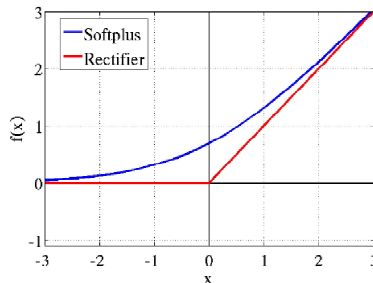
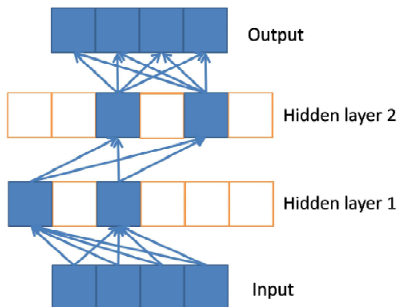
## Problem Definition

We evaluate our ideas on a genre classification problem. Insert a figure of the genre-classification pipeline. 3 boxes, feature extraction, classification, pooling, something like that. Maybe colour the feature extraction box.

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# Rectified Linear Units

Maybe just pictures? One of the activation function, one of the gradients passing. maybe mention why the gradients flow better.



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