**Computational biology – final project articles review:**

**Questions:**

* Better understanding of the SELEX exp.
* Some pre-processing or pre-weighting based on the SELEX data
* How conv is done over one hot metrics

What rectification after convolution layers stand for ?

* Filters are like PWMs ?
* Simple CNN model to start from?

In [genetics](https://en.wikipedia.org/wiki/Genetics), a **sequence motif** is a [nucleotide](https://en.wikipedia.org/wiki/Nucleotide) or [amino-acid](https://en.wikipedia.org/wiki/Amino_acid) [sequence](https://en.wikipedia.org/wiki/Sequence) pattern that is widespread and has, or is conjectured to have, a [biological](https://en.wikipedia.org/wiki/Biology) significance. For proteins, a sequence motif is distinguished from a [structural motif](https://en.wikipedia.org/wiki/Structural_motif), a motif formed by the three-dimensional arrangement of amino acids which may not be adjacent.

**Using The deep belief network (DBN) and CNNs**

https://bmcbioinformatics.biomedcentral.com/articles/10.1186/s12859-017-1561-8

http://deeplearning.net/tutorial/DBN.html

**Deep Belief Network**

Deep Belief Network (DBN) consists of multiple layers of Restricted Boltzmann machines (RBMs) [[48](https://bmcbioinformatics.biomedcentral.com/articles/10.1186/s12859-017-1561-8#CR48)], which learns model parameters in bottom-up style and layer-wise, but it is only able to learn abstract structure from one input source of data.

**Zhao Y, Granas D and Stormo GD. Inferring binding energies from selected binding sites. PLoS Computational Biology. 2009;5(12):e1000590.**

<http://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1000590>

**DeepBind – Predicting the sequence specificities of DNA- and RNA-binding proteins by deep learning** [[code](http://tools.genes.toronto.edu/deepbind/)][[paper](http://www.nature.com/nbt/journal/v33/n8/full/nbt.3300.html)]

<https://www.nature.com/articles/nbt.3300>

Attention based convolutional neural network for predicting RNA-protein binding sites

<https://pdfs.semanticscholar.org/0368/8b4cd2b53b237823df5f9cbbd695f8bd5766.pdf>

DeeperBind: Enhancing Prediction of Sequence Specificities of DNA Binding Proteins

<https://arxiv.org/pdf/1611.05777.pdf>

# **Convolutional neural network architectures for predicting DNA–protein binding**

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4908339/#!po=31.1594