Train CNNs to learn **position weight matrices (PWMs)** directly as first-layer filters.

---

**CNN Architecture**

Input Sequences

- Convolution Layer 1
  - Batch norm, ReLU, Max Pooling, Dropout
- Convolution Layer 2
  - 128 Filters

Fully Connected Layers

- Batch norm, ReLU, Dropout
- Output Layer
  - Binary Cross Entropy Loss

Diagnostics

- Model accuracy
- Area under the precision-recall curve (aUPREC)
- Motif accuracy
- Correlation with ground truth (Tomtom)

Visualizing motifs

- Input Sequences
  - Convolutional Layer
  - Rank Activations
  - Extract Sequences

### Results

- Model accuracy with motif complexity, less so for filter type
- PWM correlations and visually interpretable complement filter type

---

**Check out our preprint!**