Hyperparameter tuning part III

Plan for the lecture: models

- Tree-based models
  - GBDT: `XGBoost, LightGBM, CatBoost`
  - RandomForest/ExtraTrees
- Neural nets
  - `Pytorch, Tensorflow, Keras...`
- Linear models
  - SVM, logistic regression
  - `Vowpal Wabbit, FTRL`
- Factorization Machines (out of scope)
  - `libFM, libFFM`

Plan for the lecture: models

- **What framework to use?**
  - Keras, Lasagne
  - TensorFlow
  - MxNet
  - PyTorch
  - sklearn's MLP
  - …

They implement the same functionality! (except sklearn)

- **I recommend:**
  - PyTorch
  - Keras

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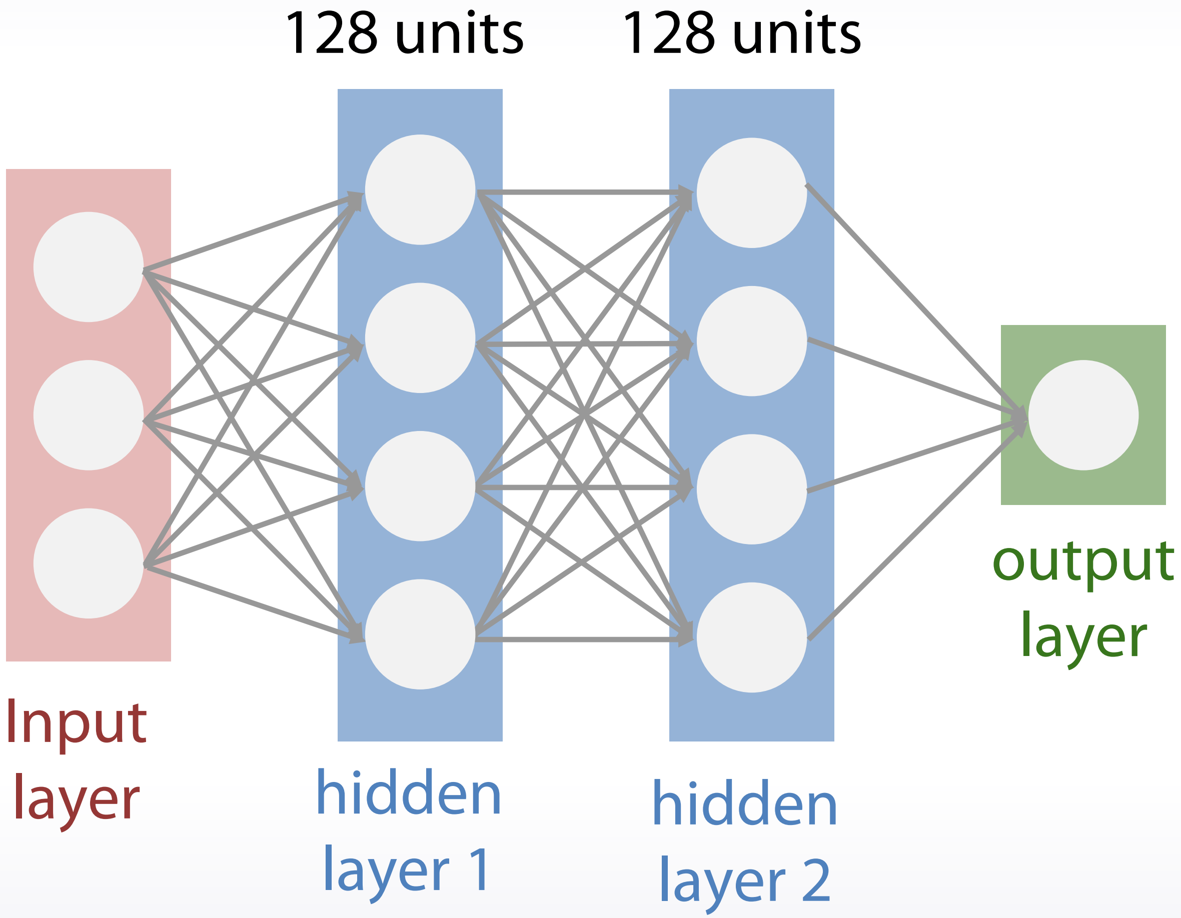
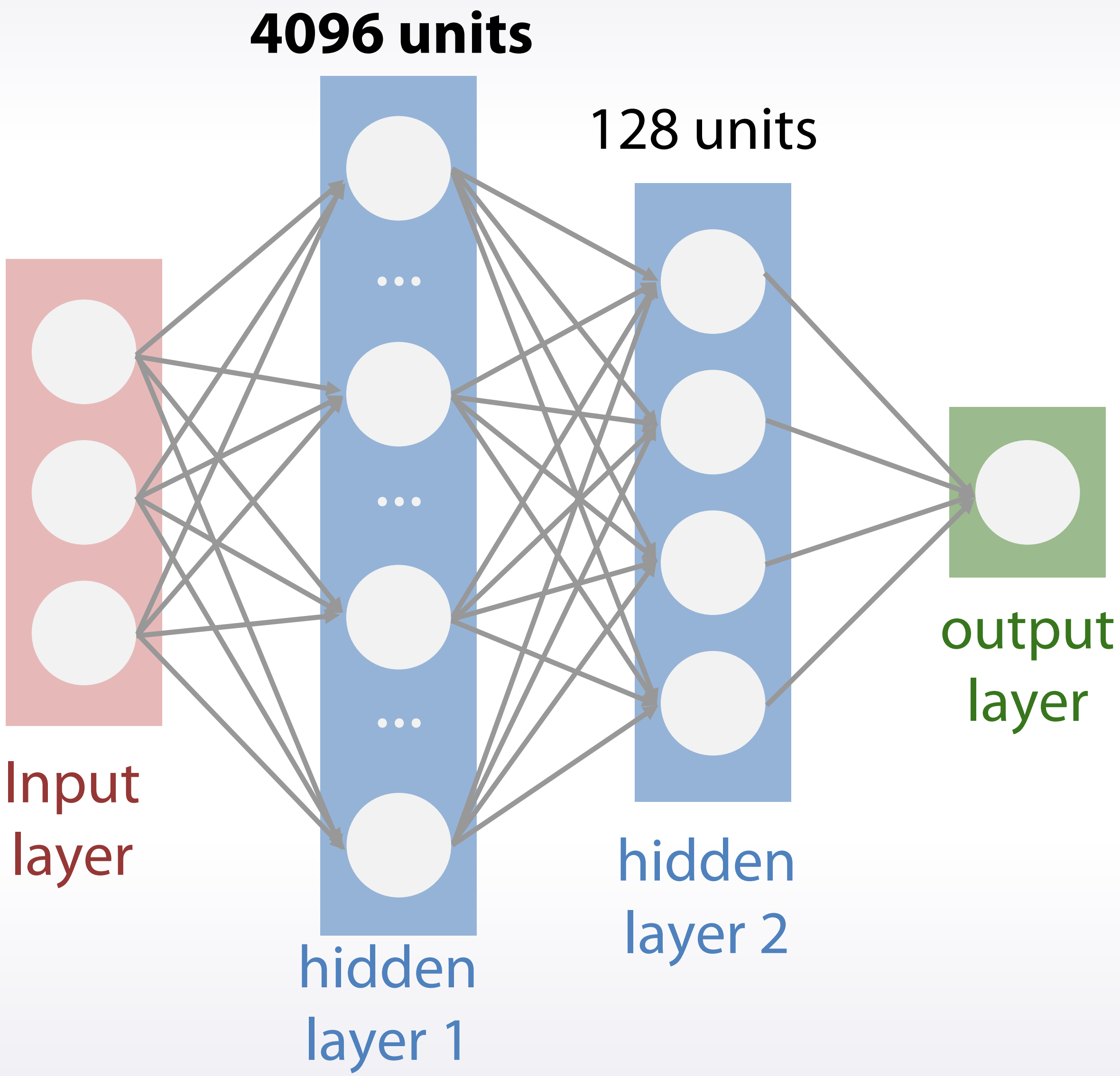
- Regularization
  - L2/L1 for weights
  - Dropout/Dropconnect
  - Static dropconnect

Static dropconnect



Based on image from *Stanford University CS231n*

Static dropconnect



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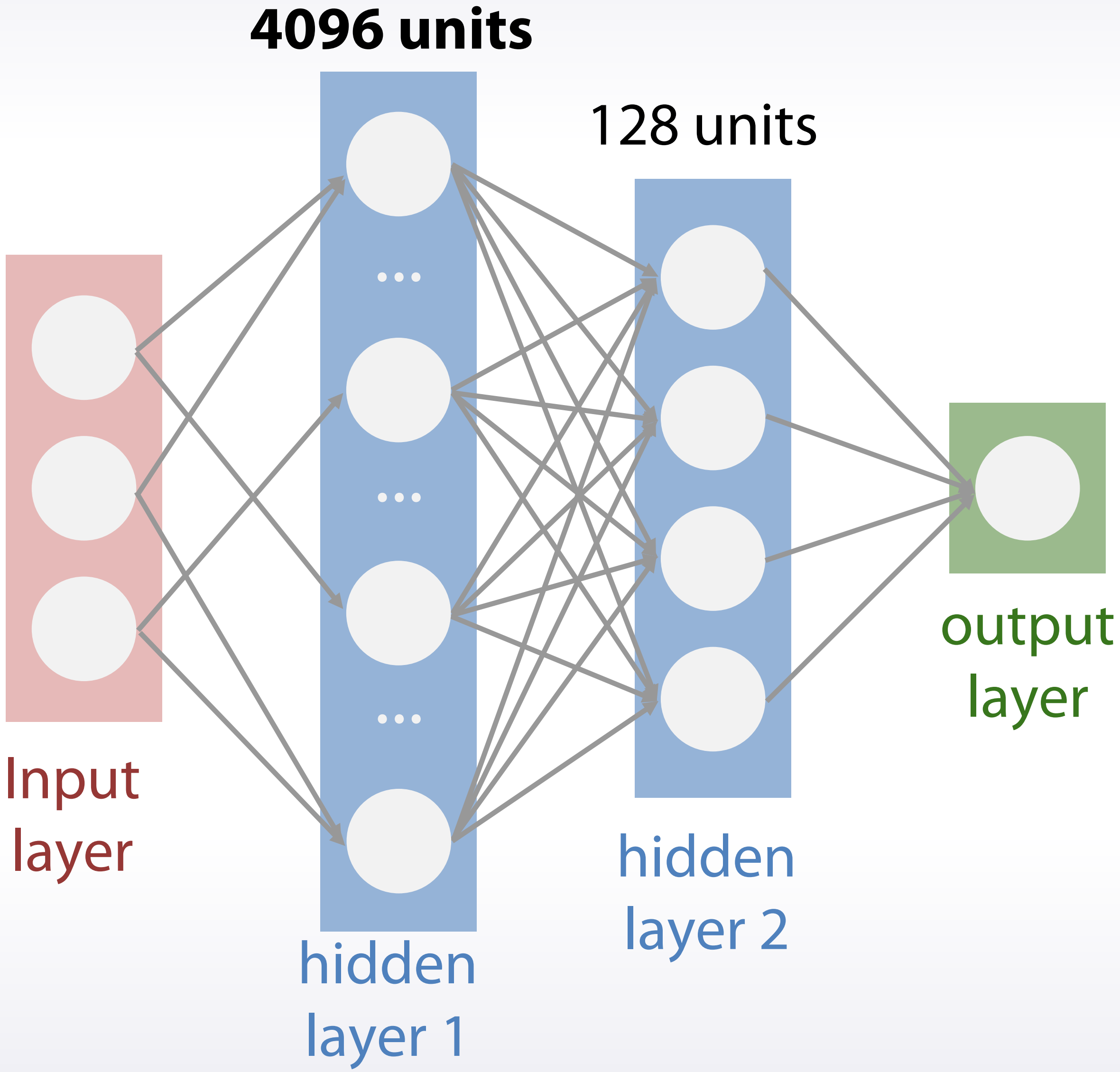

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- Regularization type
  - *L1/L2/L1+L2* -- try each
  - *L1* can be used for feature selection

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- **Be patient**
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- **Average everything**
  - Over random seed
  - Or over small deviations from optimal parameters
    - e.g. average *max_depth=4,5,6* for an optimal *5*

Conclusion

- Hyperparameter tuning in general
  - General pipeline
  - Manual and automatic tuning
  - What should we understand about hyperparameters?
- Models, libraries and hyperparameter optimization
  - Tree-based models
  - Neural networks
  - Linear models