

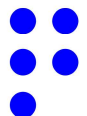
Lecture 25: Deep neural networks continued

Professor Ilias Bilionis

*# layers, # neurons per layer, regularization
parameters, etc.*

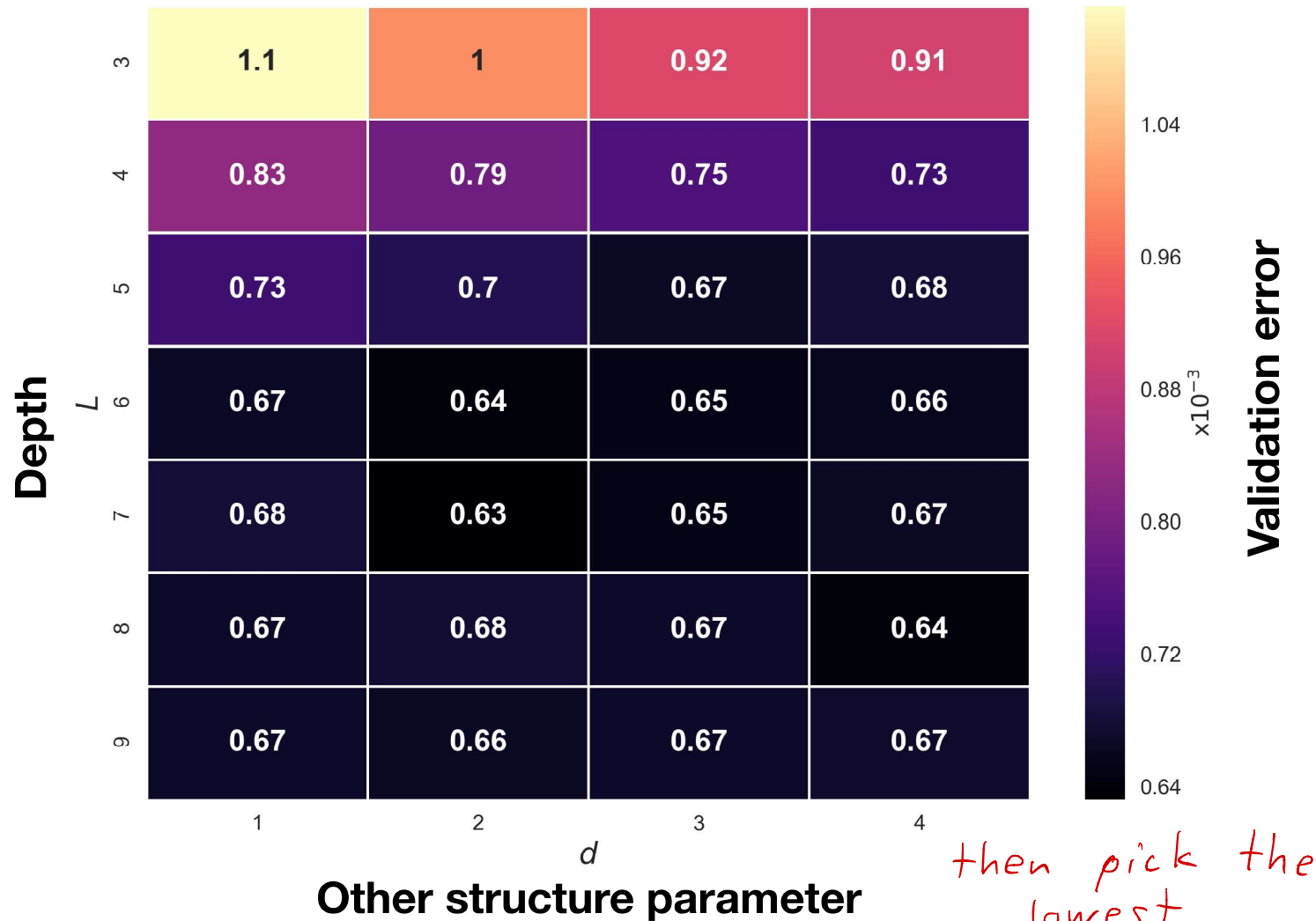
Hyper-parameter tuning

*- runs on top of the regular stochastic gradient descent
for training the parameters of the network*



best for lower number
of parameters

Grid search



Tripathy, R. K.; Bilonis, I. Deep UQ: Learning Deep Neural Network Surrogate Models for High Dimensional Uncertainty Quantification. *Journal of Computational Physics* **2018**, 375, 565–588. <https://doi.org/10.1016/j.jcp.2018.08.036>.

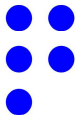
Bayesian global optimization

λ : regularization par.

$V(\lambda) =$ I train my DNN with reg. par. λ and when I'm done I compute and return the valid. error.

$$\min_{\lambda} E[V(\lambda)]$$

BGO



Bayesian global optimization



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