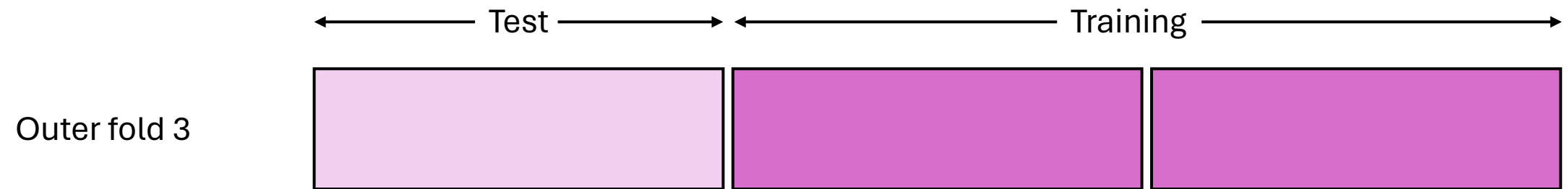
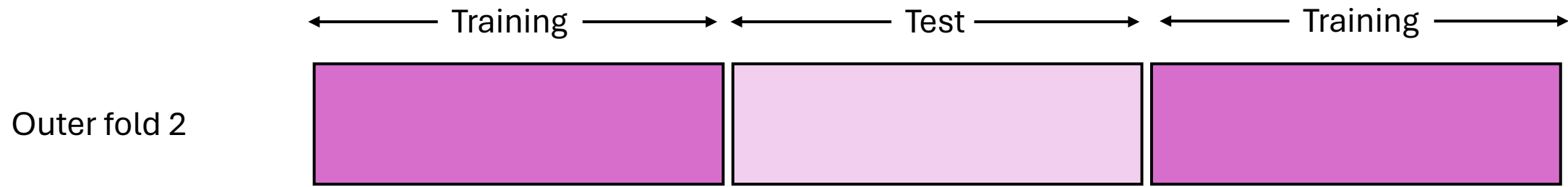
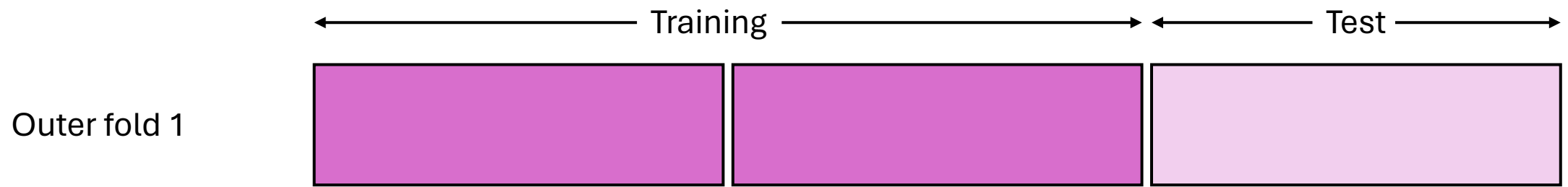
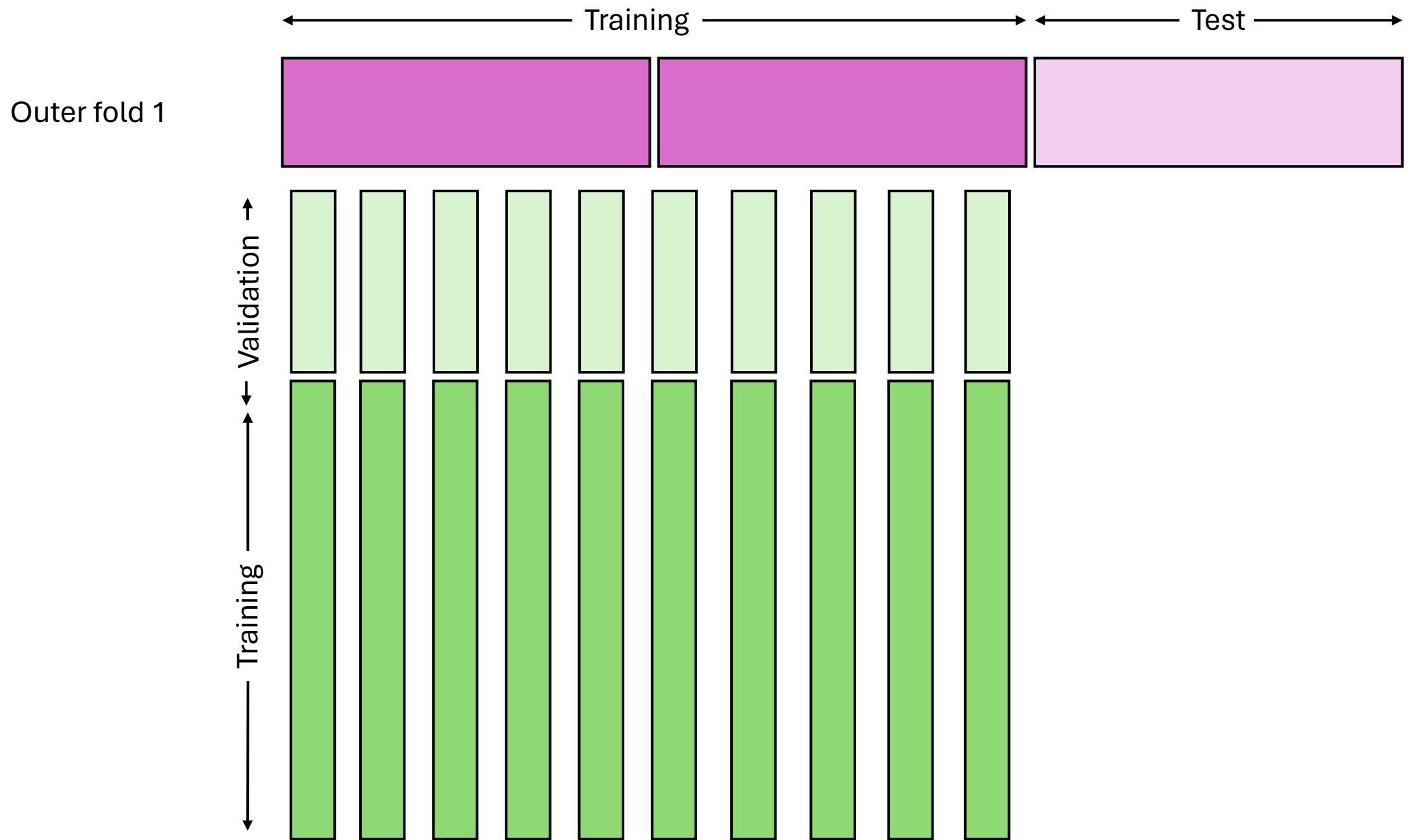


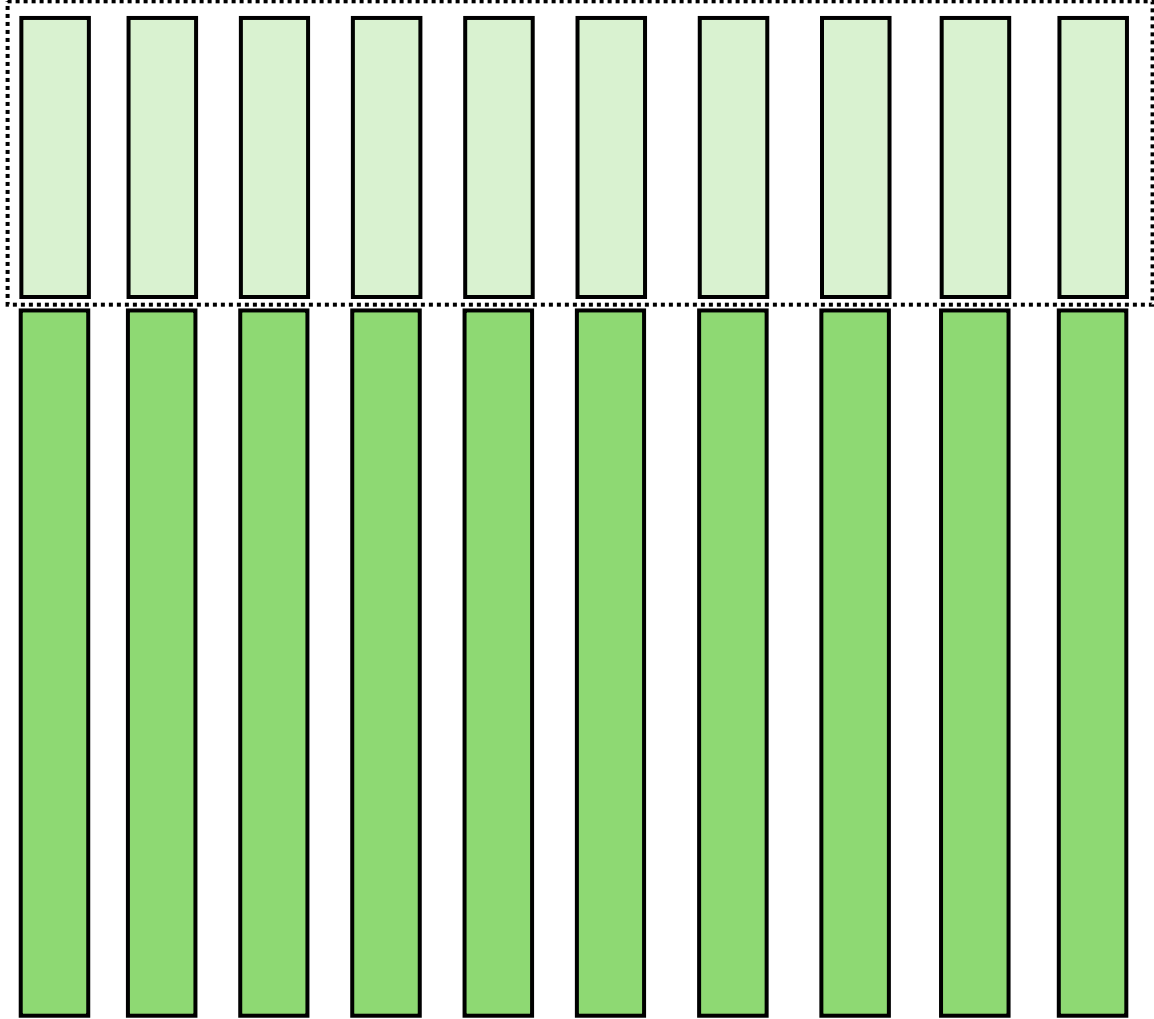
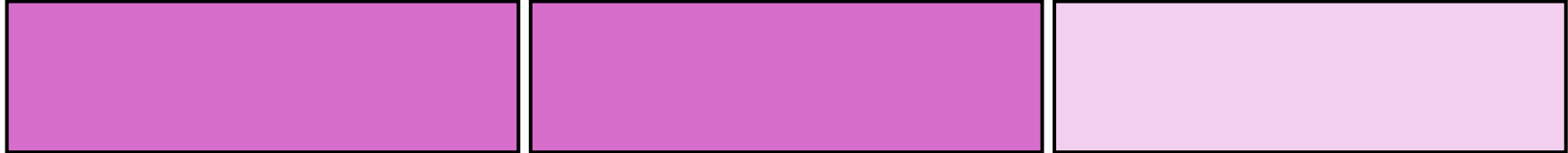
Example of nested cv

10 bootstraps for inner loop

3-fold CV for outer loop

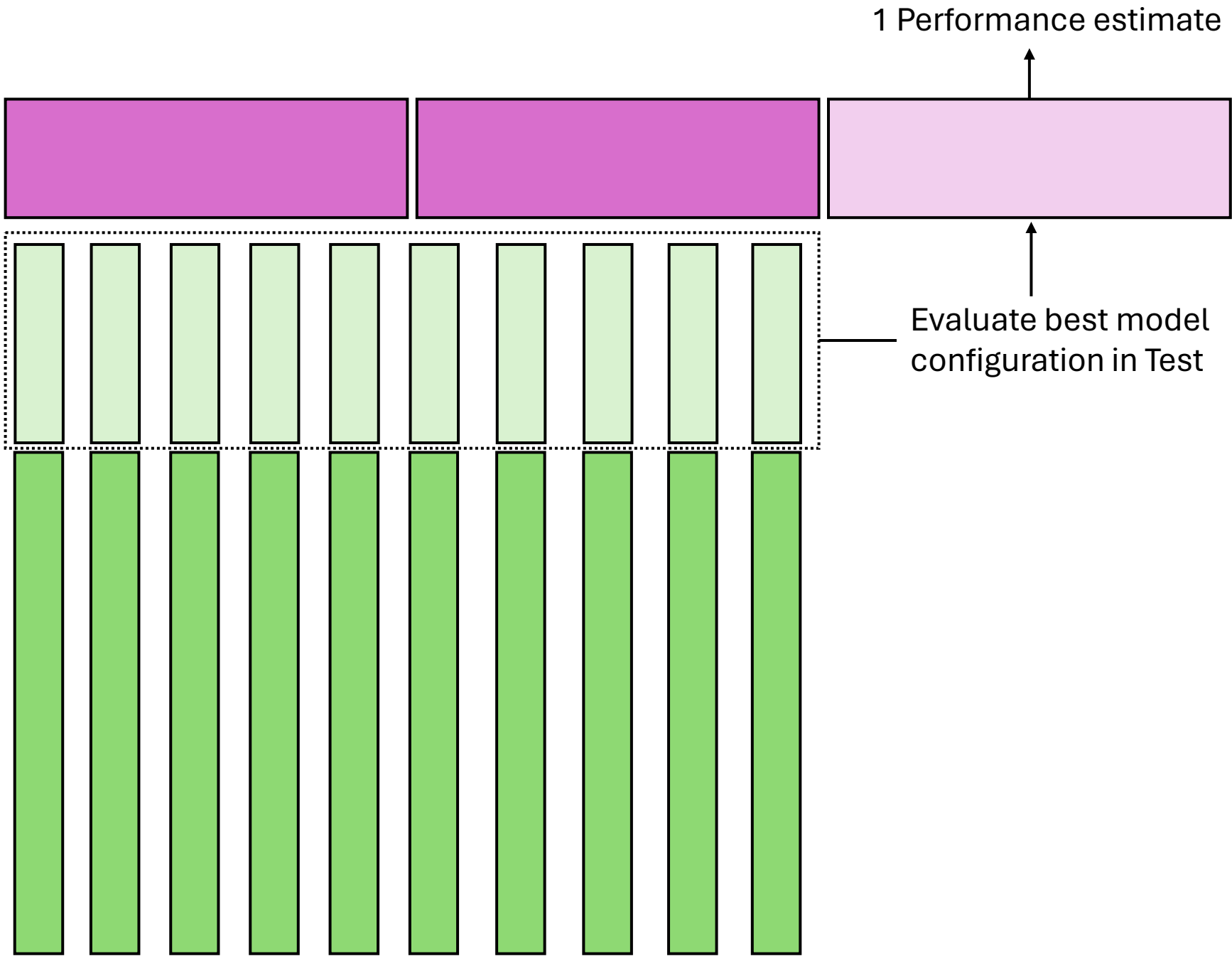


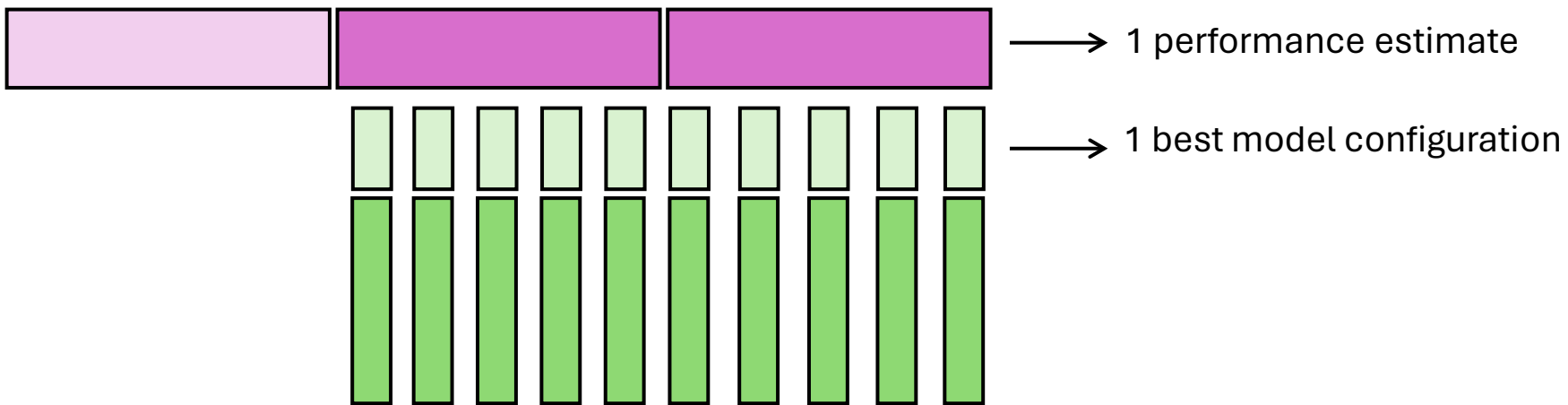
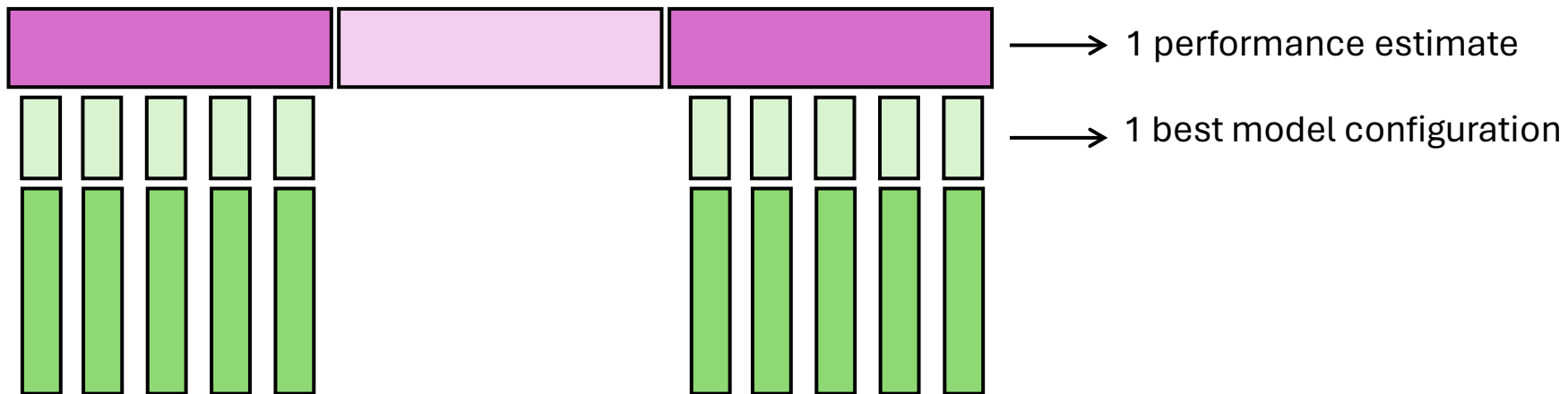
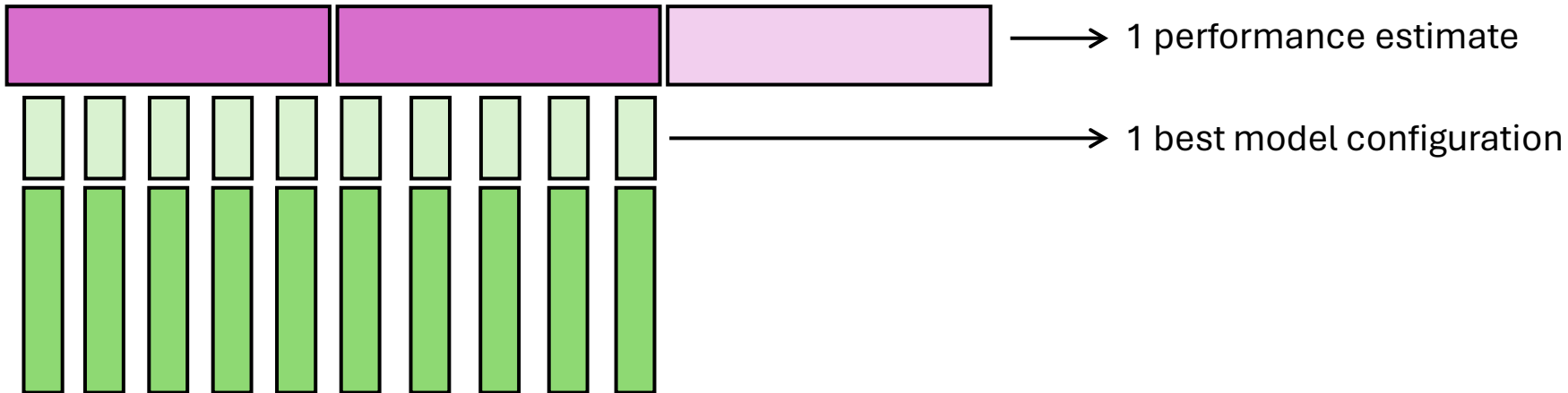




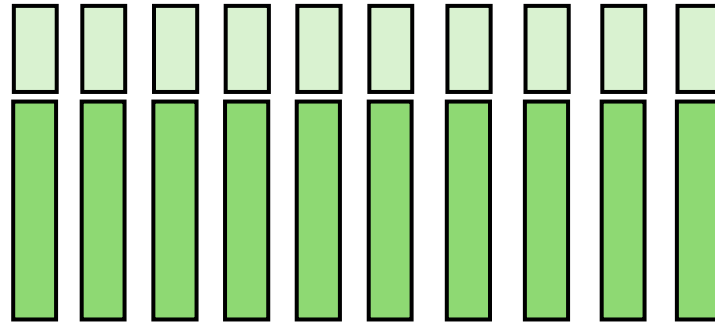
= 10 model performance estimates for each model configuration → Average these 10 estimates to get **1 performance estimate for each configuration**

Remember these performance estimates will have some optimization bias and are used for *model selection*



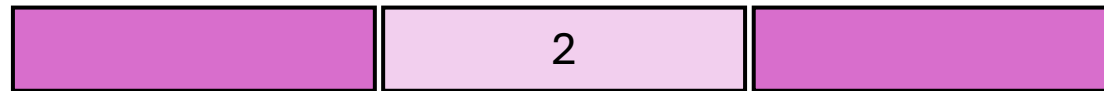


Let's walk through an example where we are evaluating 2 possible model configurations on accuracy.



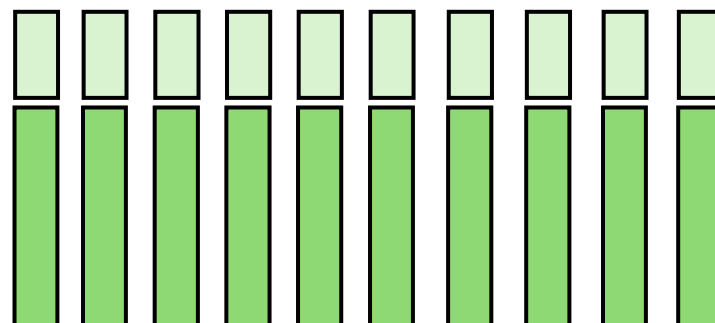
Model configuration A is best
(selected with validation set)

Accuracy in test set 1 is .89



Model configuration B is best
(selected with validation set)

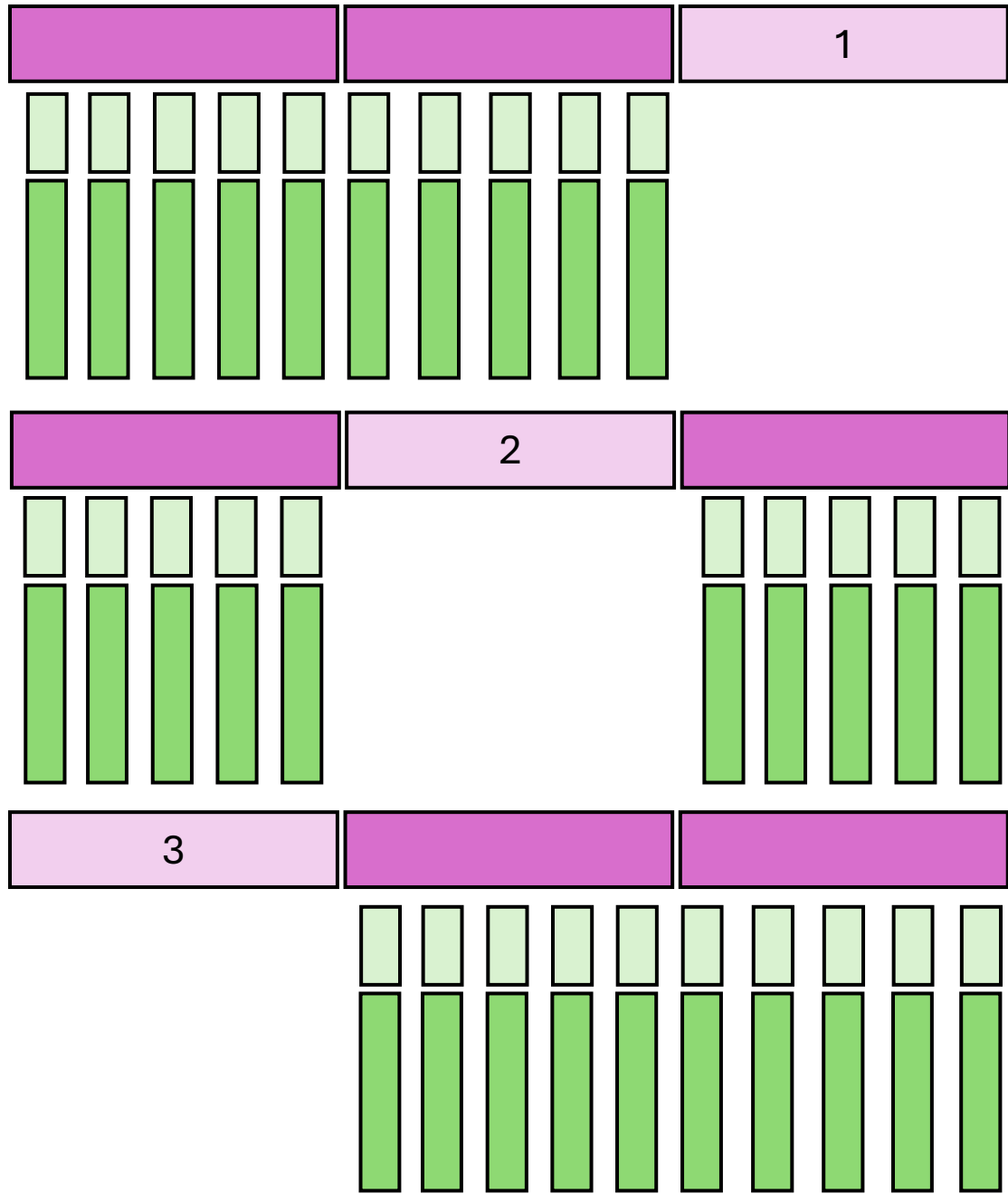
Accuracy in test set 2 is .91



Model configuration B is best
(selected with validation set)

Accuracy in test set 3 is .92

How well does our model perform on new data?

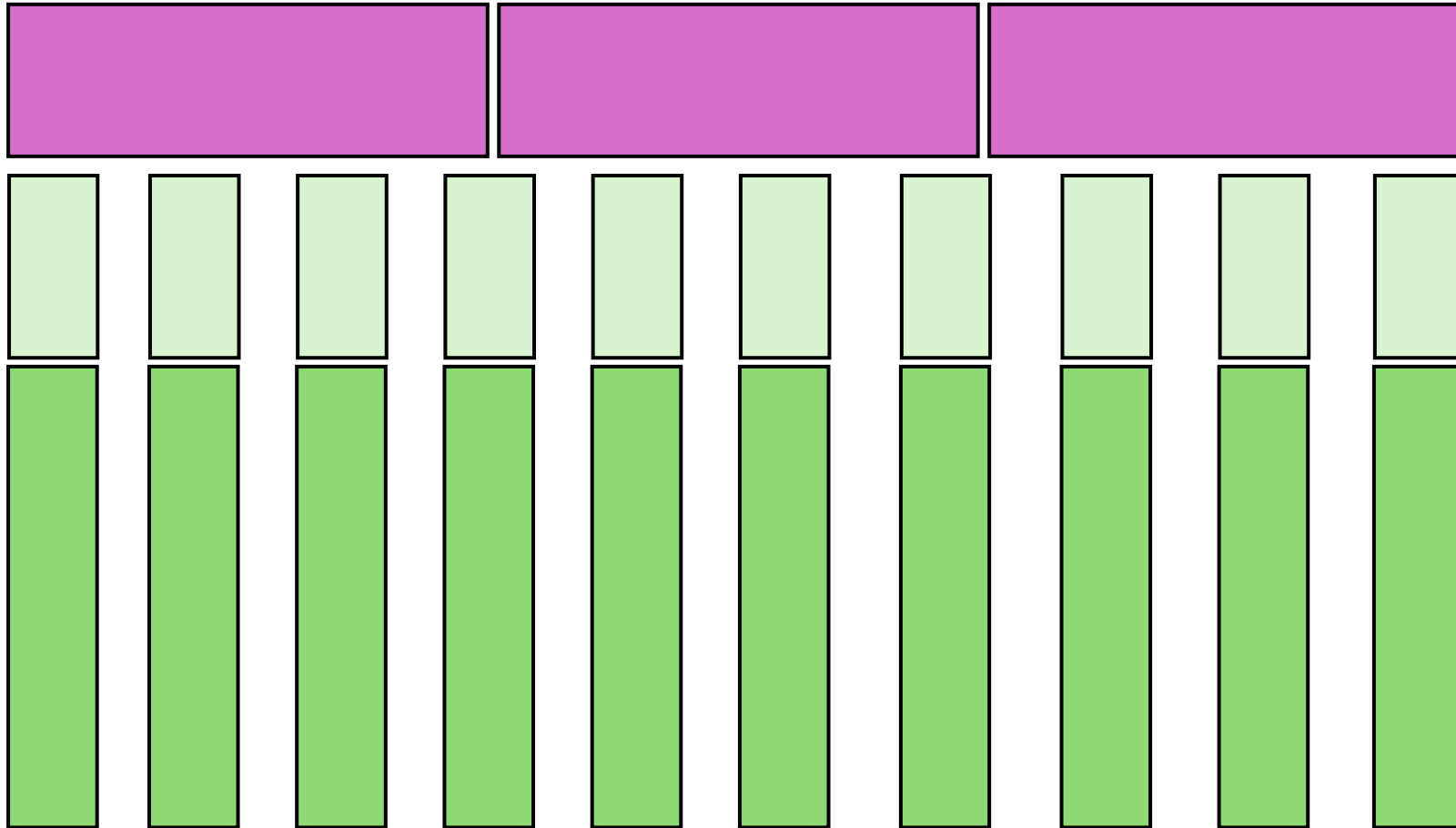


Overall model performance =
average of 3 performance
estimates

.906 accuracy

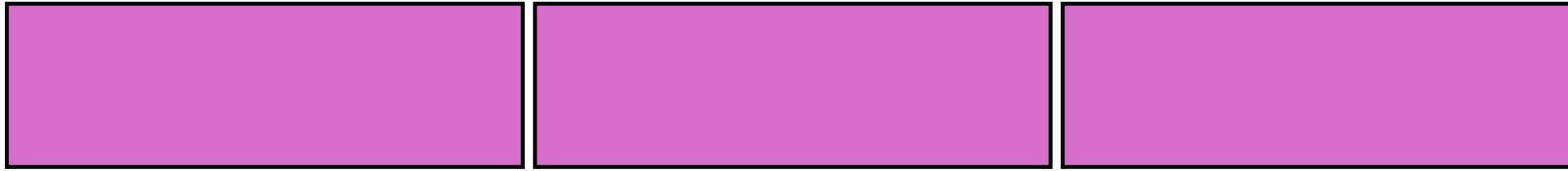
How do we know what our best model configuration is?

Use 10 bootstraps on all data to get best model configuration



Remember in nested CV we are evaluating the performance of a model configuration selected with the resampling method in our inner loop!

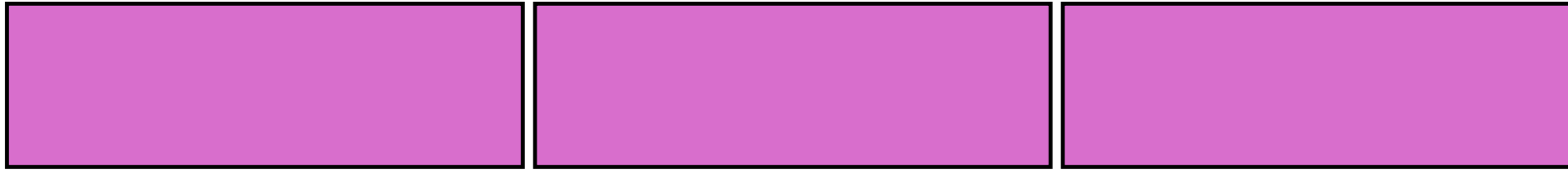
We now have a model configuration, but not a model. What should we do as a final step?



Our last step is to fit our model configuration (selected with 10 bootstraps) on all of our data. This gives us a final model.

Remember using all the data for fitting our model reduces how biased our model is.

How well do we expect a model configuration selected with bootstrapping to perform on new data?



Our last step is to fit our model configuration (selected with 10 bootstraps) on all of our data. This gives us a final model.

Remember using all the data for fitting our model reduces how biased our model is.

How well do we expect a model configuration selected with bootstrapping to perform on new data? **With .906 accuracy**