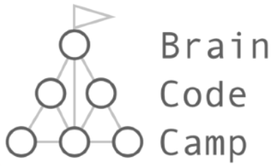
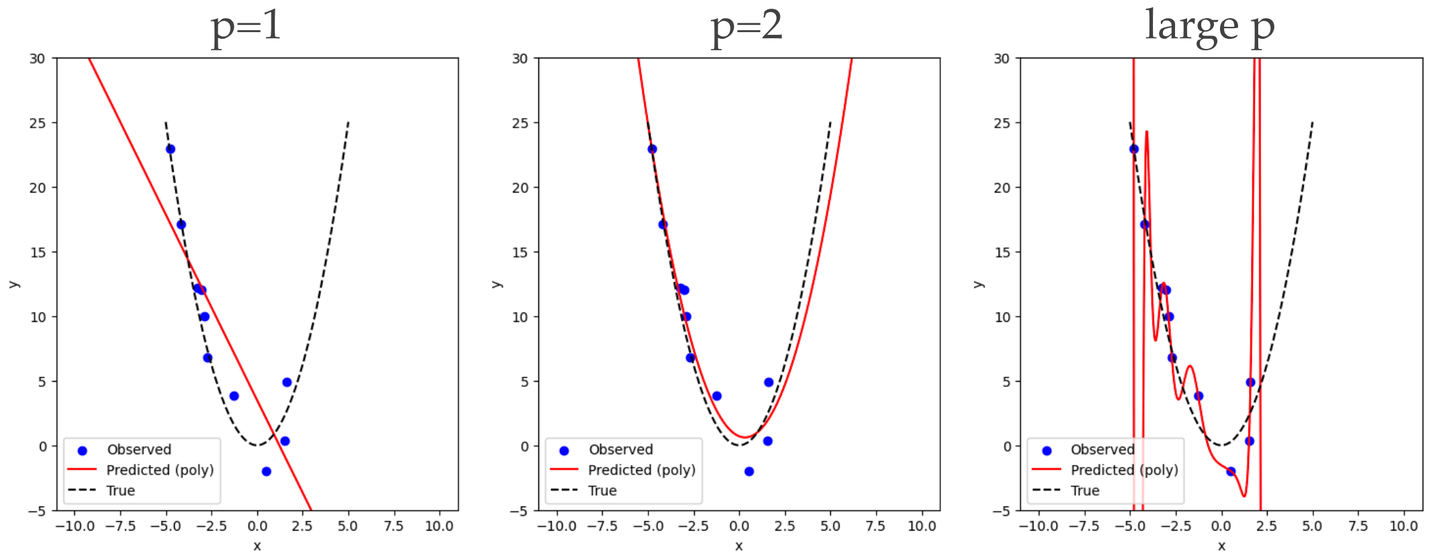


Training, Validation and Test Data

Itthi Chatnuntawech

Underfitting and Overfitting

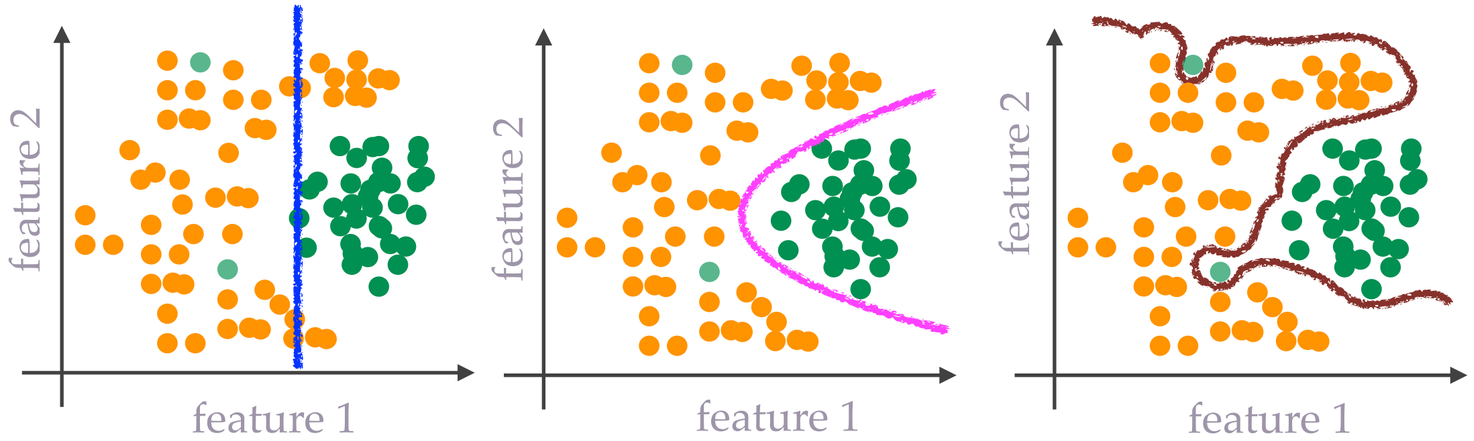
regression



How do we pick p?

Validation data!

classification



Underfitting **Overfitting**

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A Simple Pipeline & Training, Validation, and Test Data

1. Given a task, pick p for our polynomial

Ex. p = 1

2. Split the data into three groups: training, validation, and test

3. Optimize the selected model using the training data

4. Evaluate the trained model using the validation data

5. Pick more p's, optimize the models, and evaluate the trained models on the validation data

Ex. p = 2, 3, ..., 15

Ex. Pick the model with the lowest validation error (out of the 15 models)

6. Use the model with the lowest validation error as your final model

7. Evaluate the final model on the test data

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Example: Training, Validation, and Test Data

Scenario: A time-limited, two-choice neuroscience exam will be held next year.
We have come up with 4 strategies (i.e., 4 models) for acing the upcoming exam.

- AI #1: Always pick choice 1
- AI #2: Pick choice 1 for the first half of the exam and learn what to answer for the rest
- AI #3: Pick choice 2 for the first half of the exam and learn what to answer for the rest
- AI #4: Learn what to answer for all questions

Training	Validation	Test
Practice problems and previous exams from the last decade (except 2018-2023)	2018-2023 exams	The upcoming exam (unseen)

Steps

1. Use the training problems and exams to teach all the AI models.
2. Use the validation exams to see how the trained models perform.
3. Select the AI model that achieves the highest score on the validation exams to take the upcoming exam (test exam) for you

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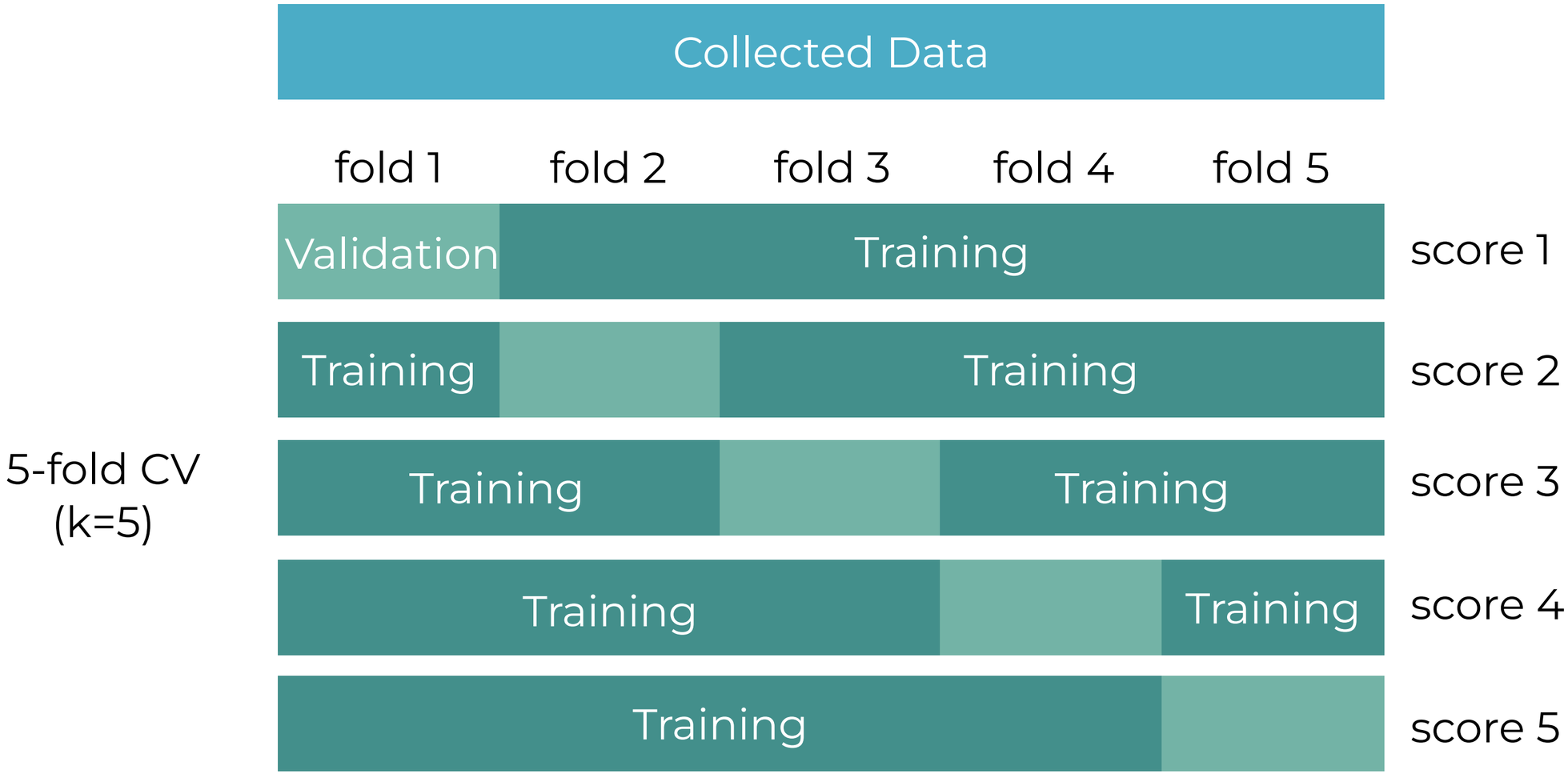
K-Fold Cross Validation



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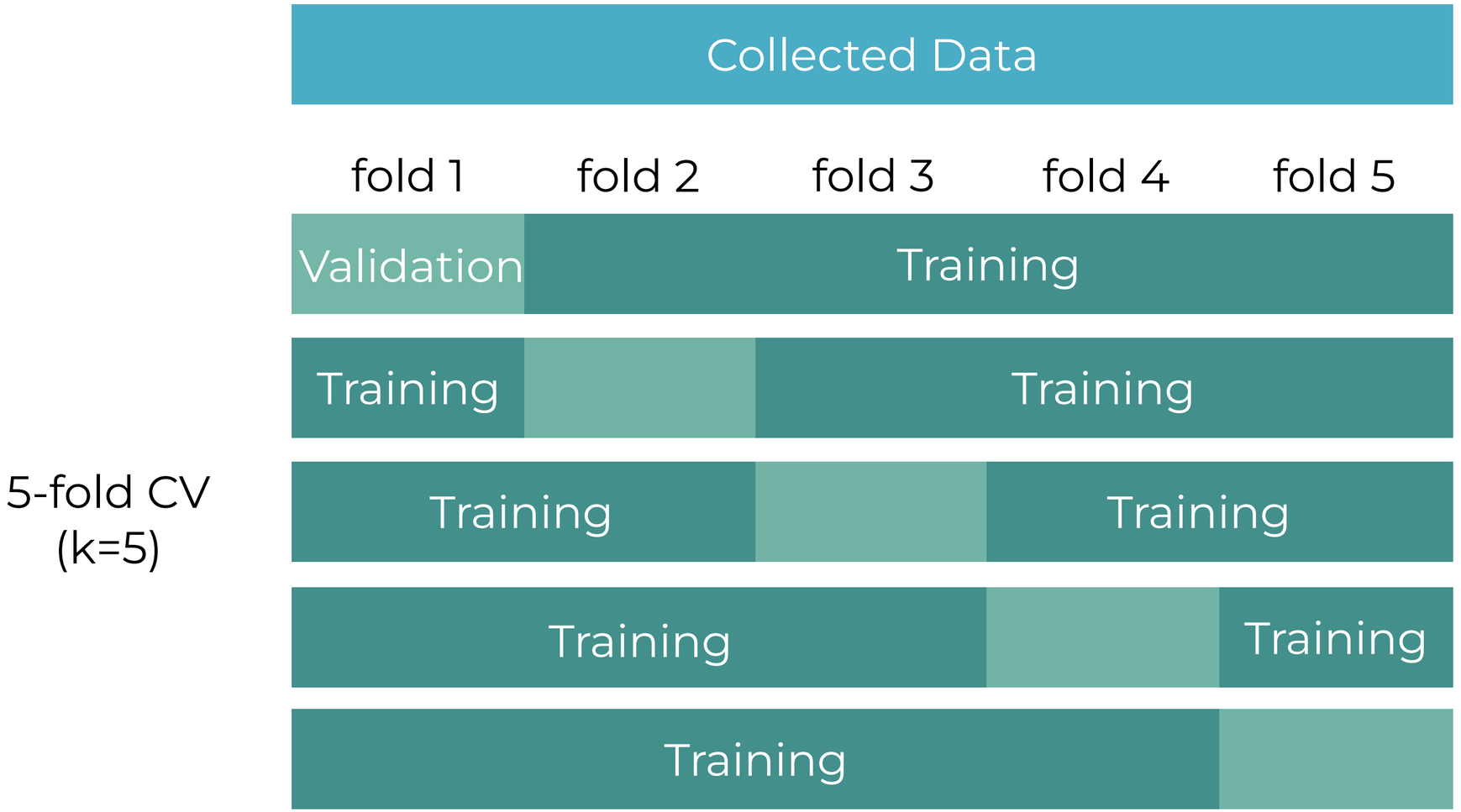
K-Fold Cross Validation



5-fold CV (k=5)

If k = # of samples, we get leave-one-out-cross validation (LOOCV)

combined score (e.g., average)

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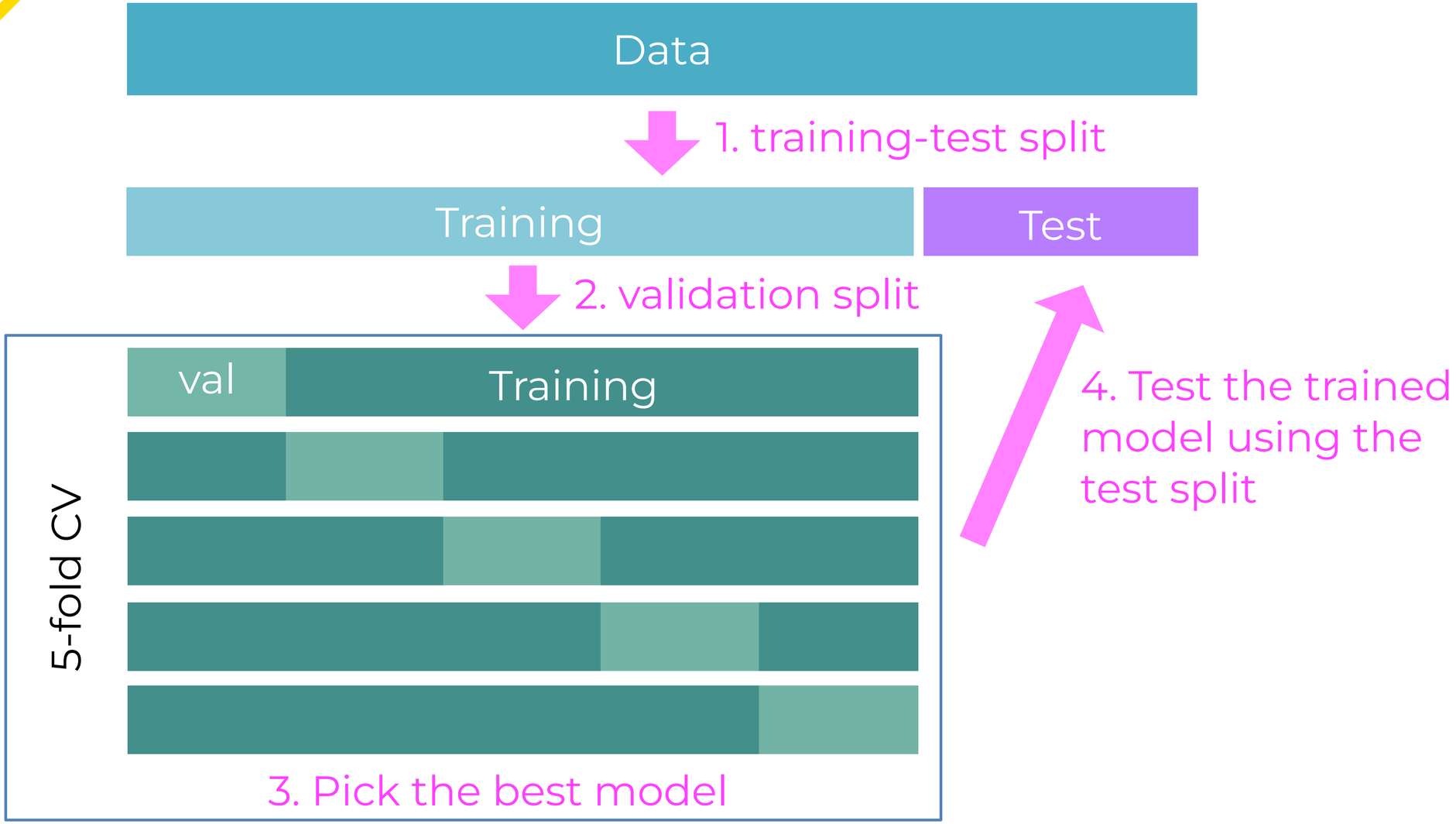
A simple practical approach



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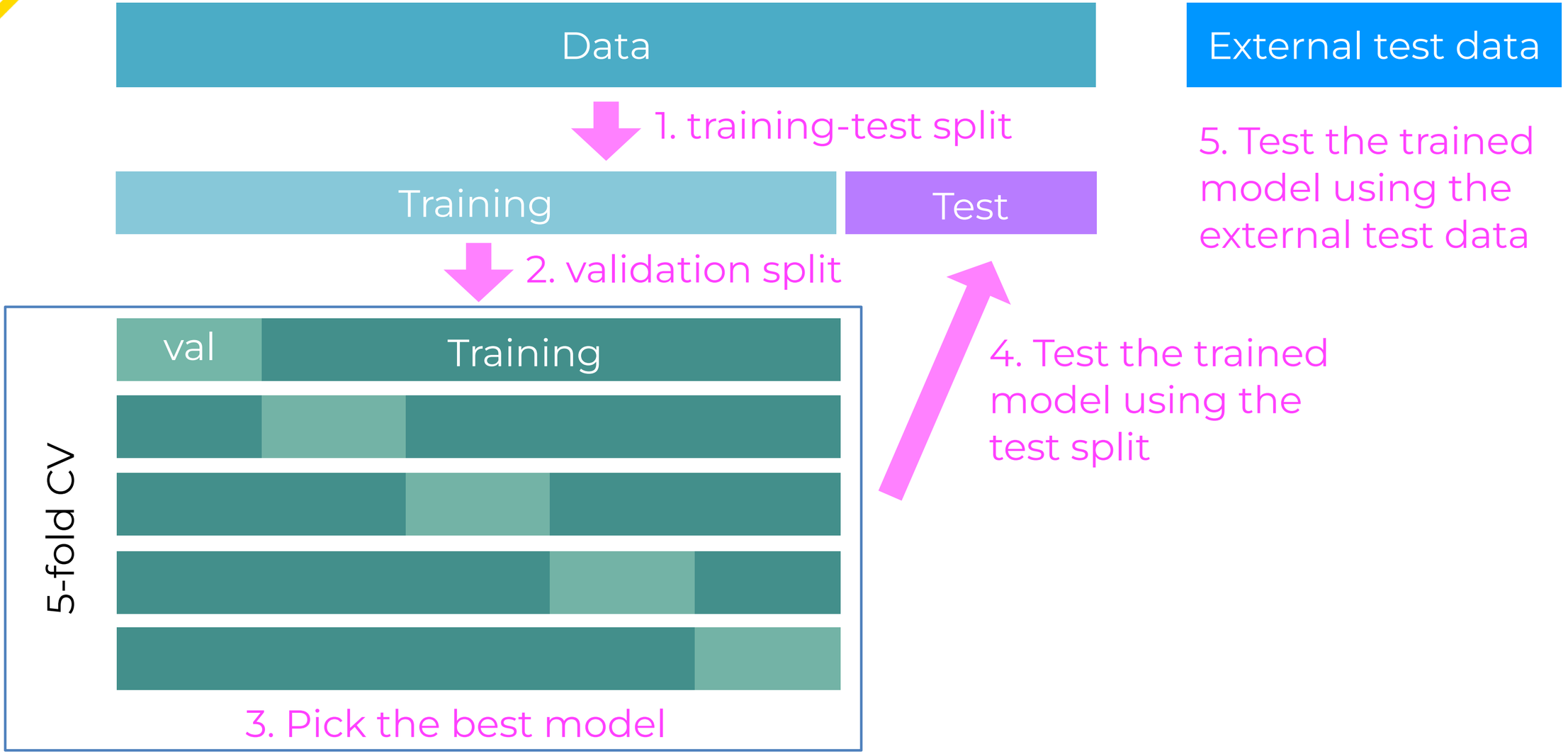
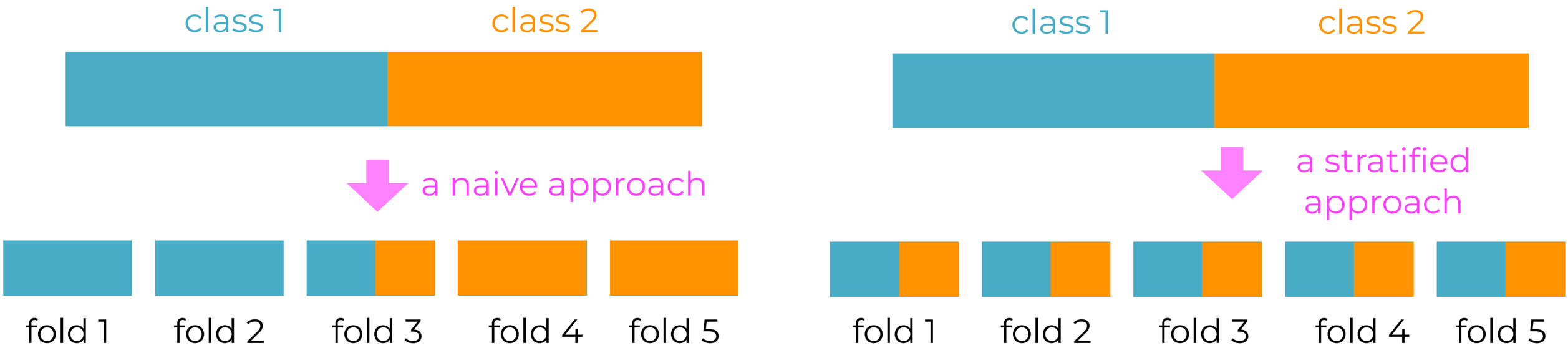
A simple practical approach



Stratified CV



Class imbalance