09.05.2023

OPENCAMPUS.sh

Machine Learning With TensorFlow

CNNS TENSORFLOW PART I

- QUIZ
- ASSIGNMENTS
- PROJECT TEAMS
- BREAKOUT DISCUSSIONS
- INPUT
- OPEN DISCUSSION

QUIZ

https://forms.office.com/r/dVuU5yrEH9

ASSIGNMENTS

ASSIGNMENTS NEXT WEEK?

PROJECT MILESTONES

- 02.05 Present your ideas
- 09.05 Form groups
- 16.05 Literature review
- 23.05 Dataset characteristics
- 30.05 Baseline model
- 06.06 Tensorboard
- 13.06 Model & model evaluation
- 20.06 & 27.06 Final presentation

DEFAULT PROJECTS

- Bakery sales prediction
- Pizza vs no pizza Classification
- Black & White images to RGB

BAKERY SALES PREDICTION

Data:

- Sales of 4 local bakeries per day (2 years of data)
- Provided by meteolytics

Task:

- Train a model for time-series-prediction
- Explore different models
- Predict future sales for a week

PIZZA VS NO PIZZA

Data

- 1000 images of pizza – 1000 images of other foods
- Real world data (different sizes, angles, motifs)

Task

- Data exploration
- Binary classification using convolutions
- Look into transfer learning

BLACK & WHITE IMAGES TO RGB

Data

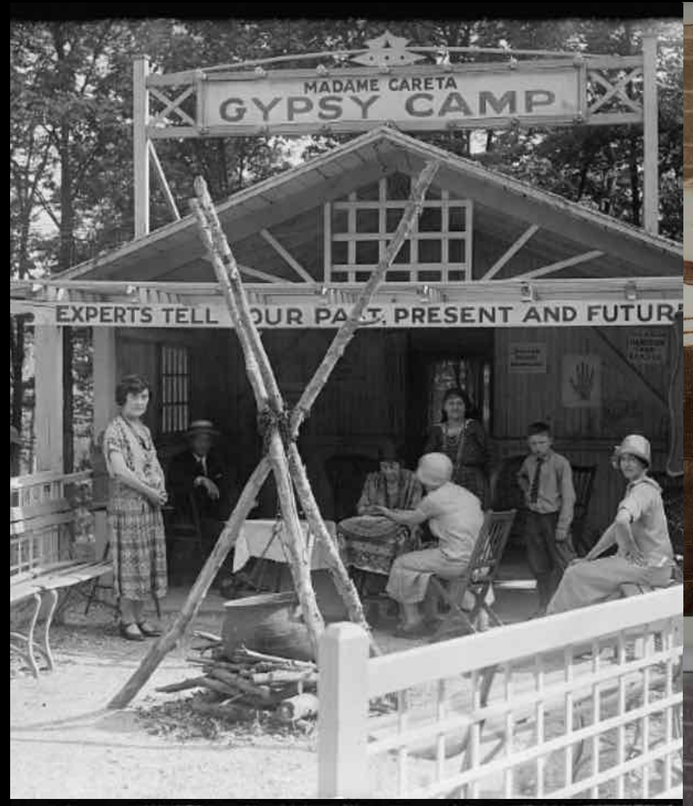
- Any images you like

Task

- Search for a set of images (dataset, your own photos)
- Apply grayscale on the images in python
- Train a Neural Network that realisticly recolors gray images

Optional

- Test with your own images



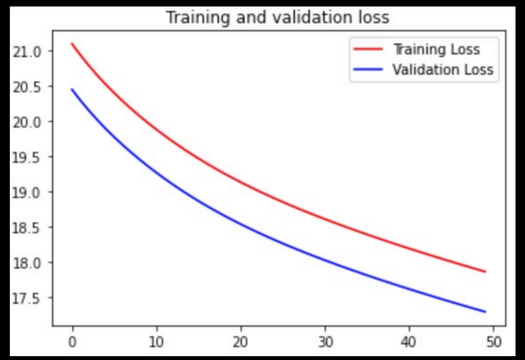
PROJECT TEAMS

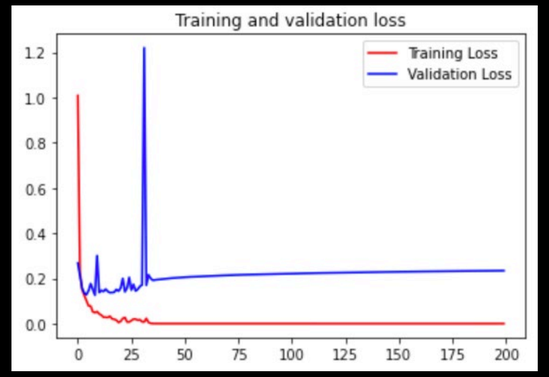
- Are journalist opinions influenced by short sale data? - Robert
- Detection from railways in old maps – Genevieve
- Predicting cardiac health conditions from ECG data - Maximilian
- Detect geographical surface features from elevation data – Markus
- Classification of marine animals from images – Jan
- Classification of tree leafs – Rufus
- Sudoku Solver – Christoph
- Detect Boardgame Careers – Benjamin
- Find and predict learning types on digital learning platforms - Henri
- Bakery Sales
- Pizza vs no Pizza
- Black&White to RGB

BREAKOUT DISCUSSION

The following graphs are loss curves from different learning scenarios, all with the same model on MNIST.

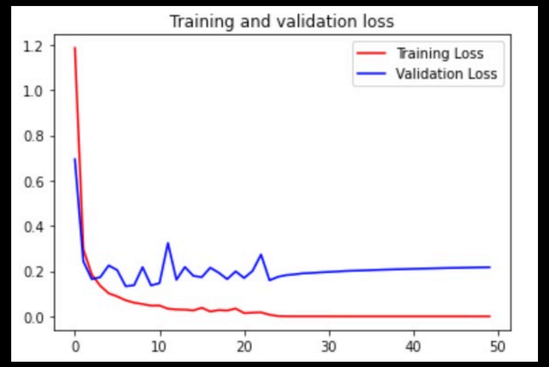
- What happens and what could be the reason? If there is a problem, how would you solve it?





The following graph is again a loss curve.

- At what point does overfitting take place?
- Can you use the loss curve to decide when to stop training to avoid overfitting?



INPUT: PERFORMANCE ESTIMATION

Why do we split the data into training and validation set?

What’s the downside of a single split?

INPUT: PERFORMANCE ESTIMATION

Why do we split the data into training and validation set?

- We want an unbiased performance estimate
- If we evaluate on the training set, we will be overconfident
- Example: If the model just learns the solutions by heart, it does not generalize, but has perfect performance?

What's the downside of a single split?

INPUT: PERFORMANCE ESTIMATION

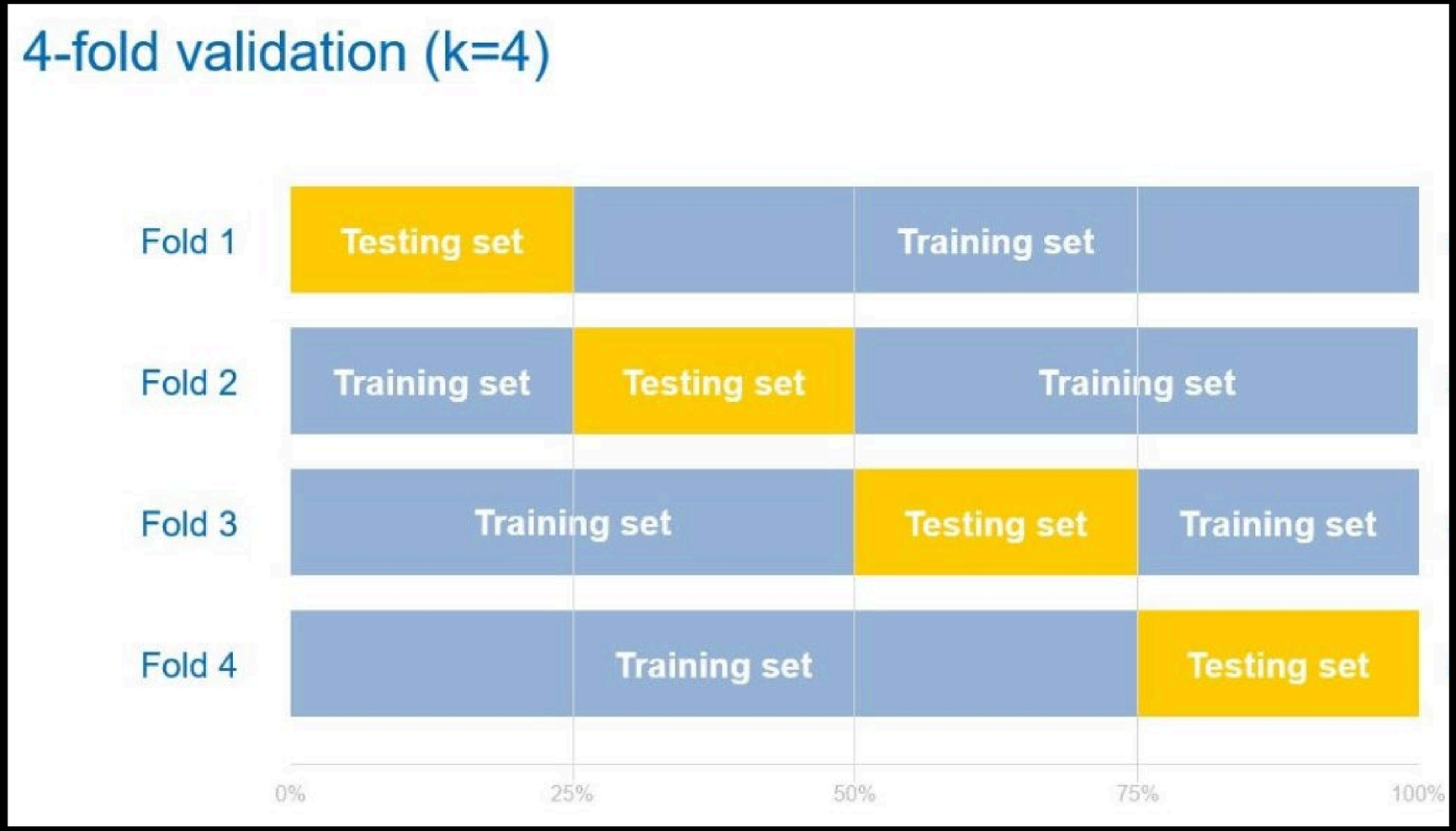
Why do we split the data into training and validation set?

- We want an unbiased performance estimate
- If we evaluate on the training set, we will be overconfident
- Example: If the model just learns the solutions by heart, it does not generalize, but has perfect performance?

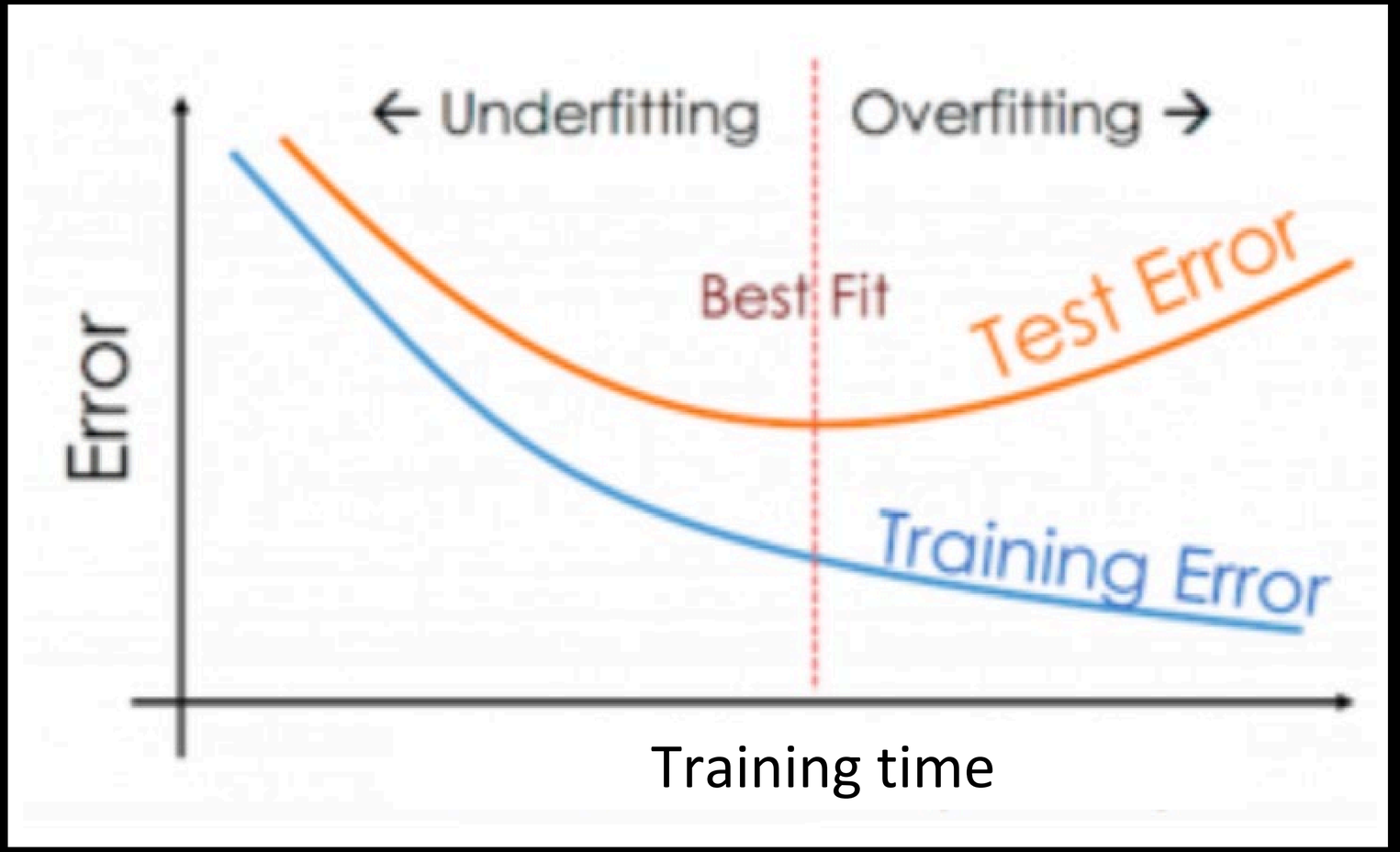
What's the downside of a single split?

- We use only a subset of the data to test on
- We could get a better performance estimate if we tested on more data

INPUT: CROSS-VALIDATION



INPUT: TRAINING CURVES & OVERFITTING



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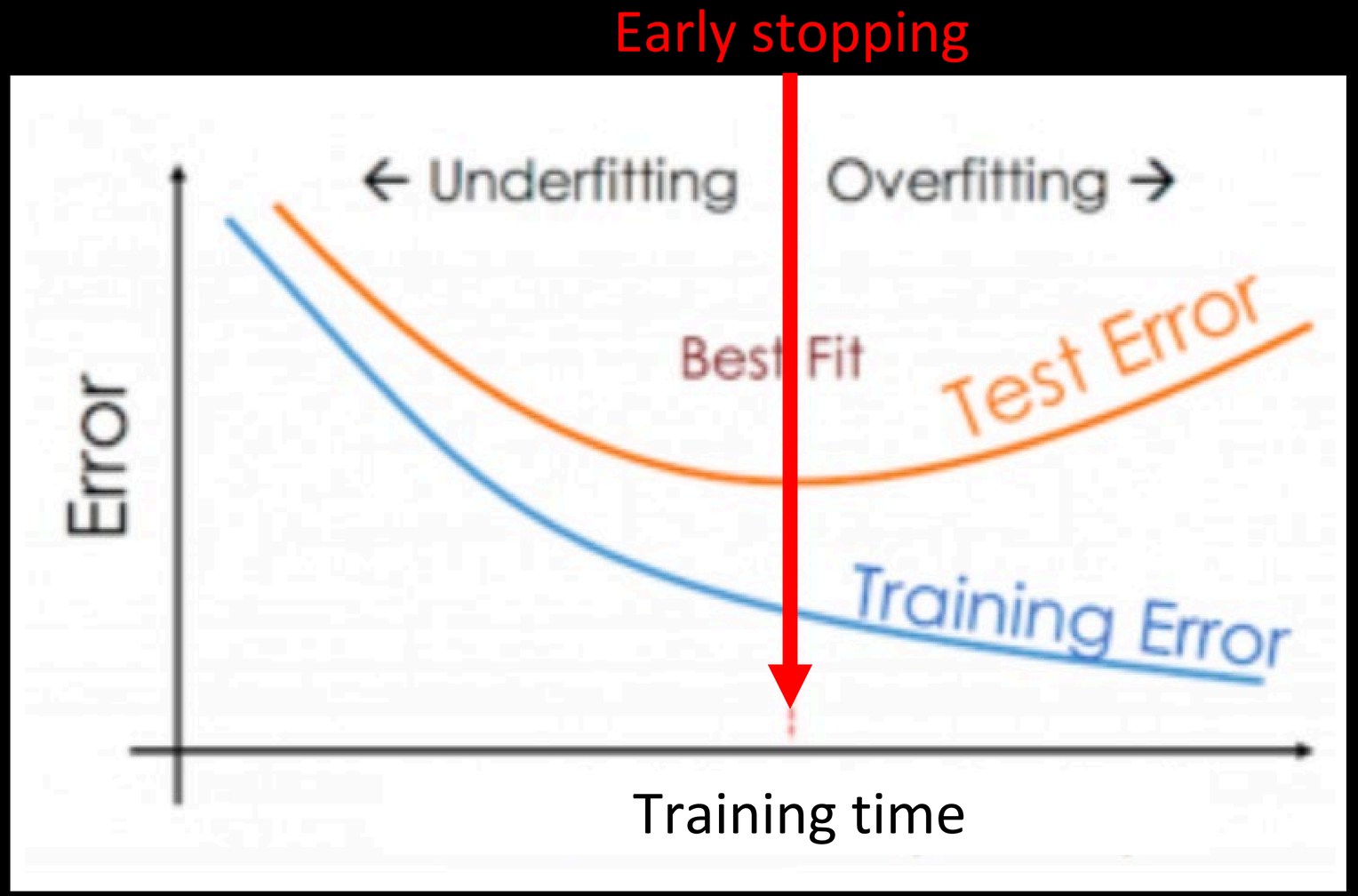
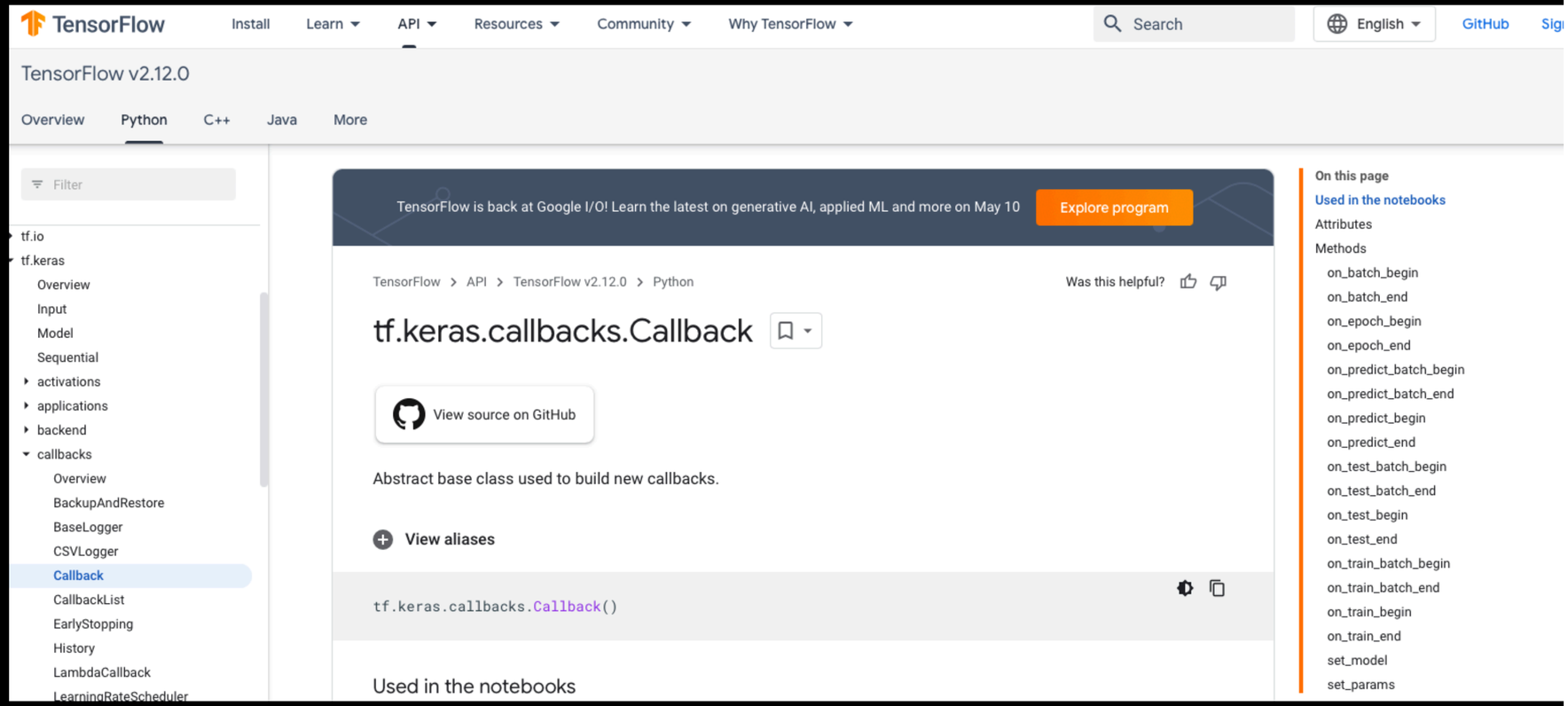


INPUT: EARLY STOPPING CALLBACK

```
tf.keras.callbacks.EarlyStopping(
    monitor='val_loss',
    min_delta=0,
    patience=0,
    verbose=0,
    mode='auto',
    baseline=None,
    restore_best_weights=False,
    start_from_epoch=0
)
```

INPUT: CALLBACKS



Methods

- on_batch_begin
- on_batch_end
- on_epoch_begin
- on_epoch_end
- on_predict_batch_begin
- on_predict_batch_end
- on_predict_begin
- on_predict_end
- on_test_batch_begin
- on_test_batch_end
- on_test_begin
- on_test_end
- on_train_batch_begin
- on_train_batch_end
- on_train_begin
- on_train_end

OPEN DISCUSSION

- What is the relationship or difference between loss and accuracy?
- What is the relationship or difference between a batch and an epoch and what is the effect of choosing a smaller or larger batch size?
- Besides the ones shown in the lecture, what other possible forms of image augmentation can you think of, and what is the difference between image augmentation and computer-generated images (CGIs)?

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NEXT WEEK: LITERATURE REVIEW

- Review literature for your project until next week
- Present your review to another project group (8-10 minutes)
- Two to three papers (or blogs), briefly state what they did and what you learned from them for your project

TASKS UNTIL NEXT WEEK

- Completion of the learning material of week 3 and 4 of the course ”CNNs in TensorFlow“
- Literature review in your group with presentation
  - 2-3 papers, briefly state what they did and what you learned from it for your project (8-10 minutes)