30.10.2025

OPENCAMPUS.sh

Machine Learning With TensorFlow

INTRODUCTION TO TENSORFLOW PART I

- Quiz
- Assignments
- Questions
- Input
- Projects

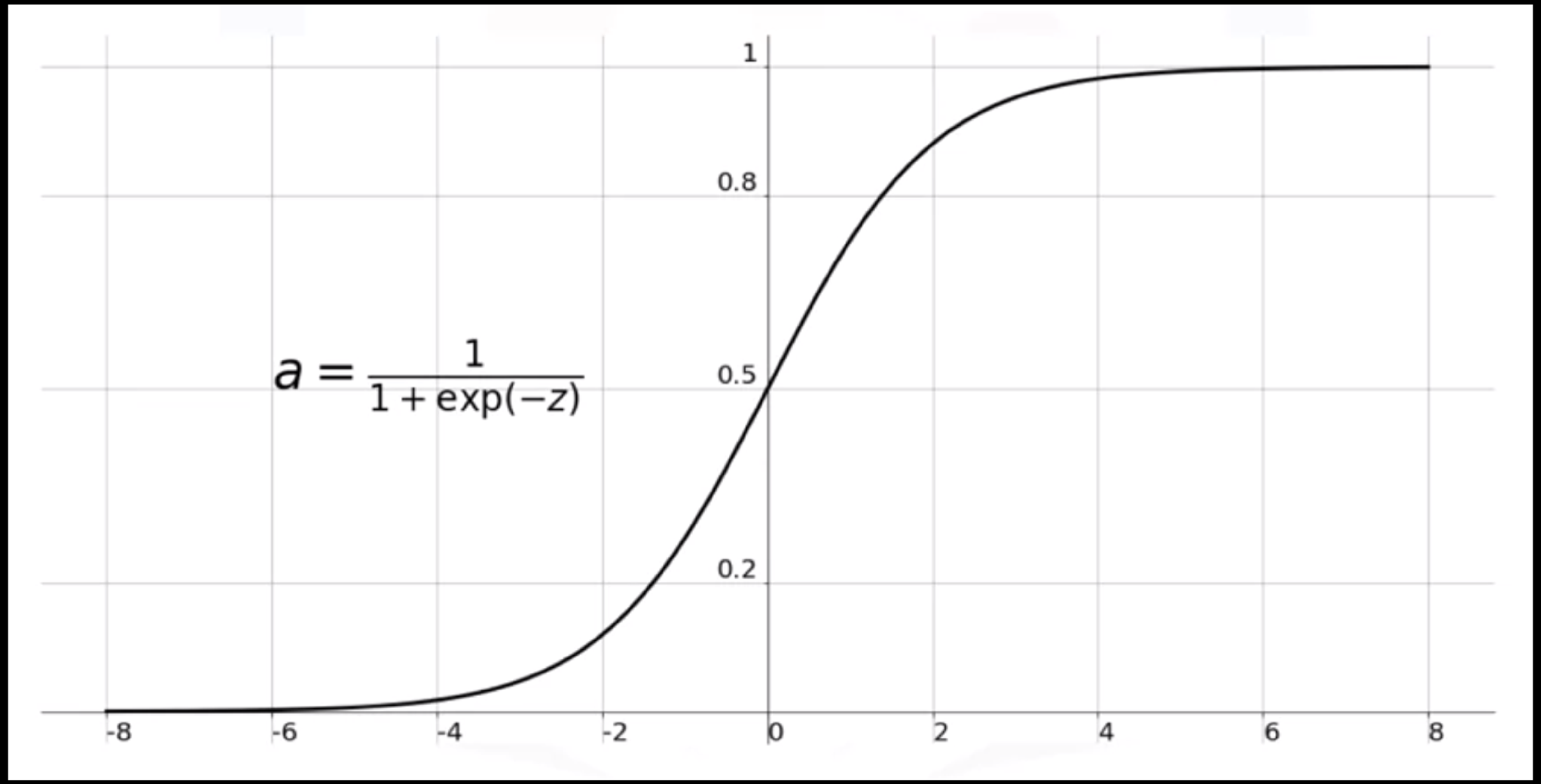
QUIZ

https://forms.office.com/e/2n8yfRn6EK

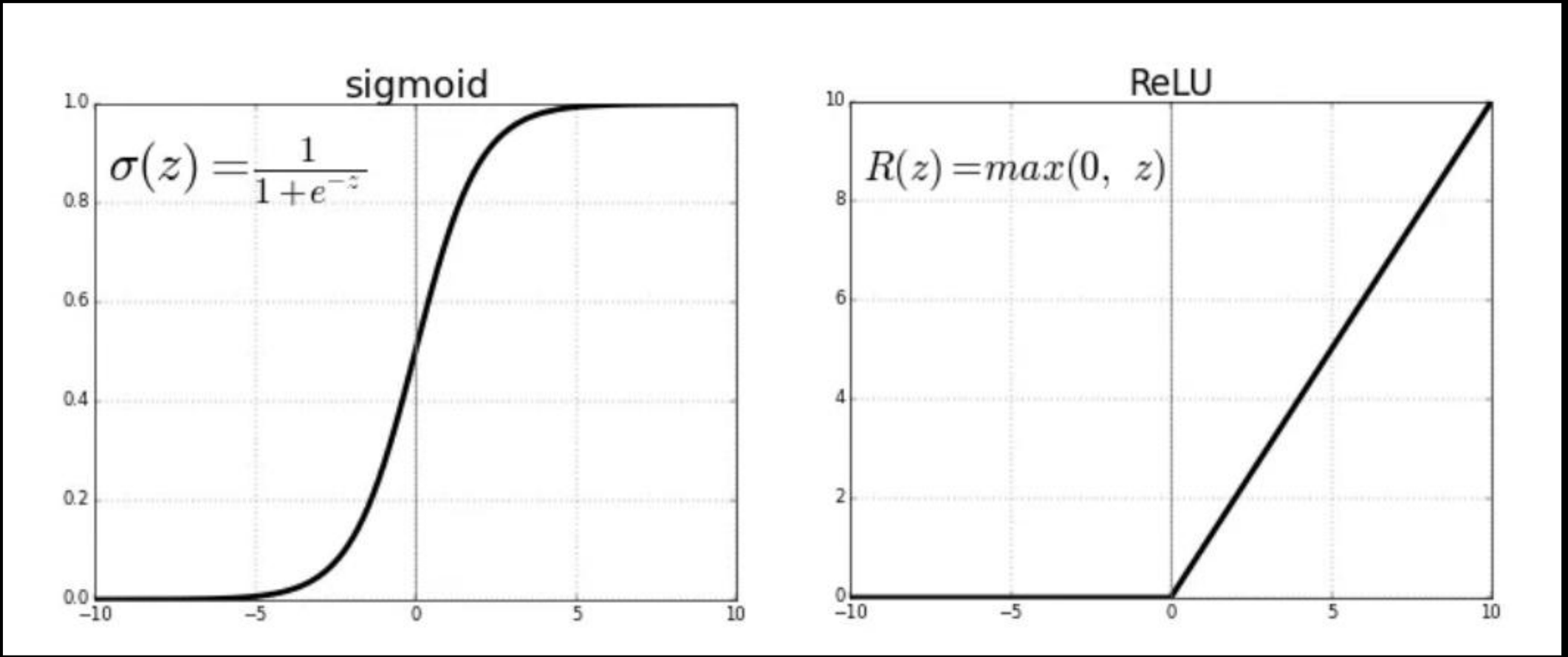
ASSIGNMENTS

ASSIGNMENTS:
WHO WILL PRESENT NEXT?

SIGMOID FUNCTION

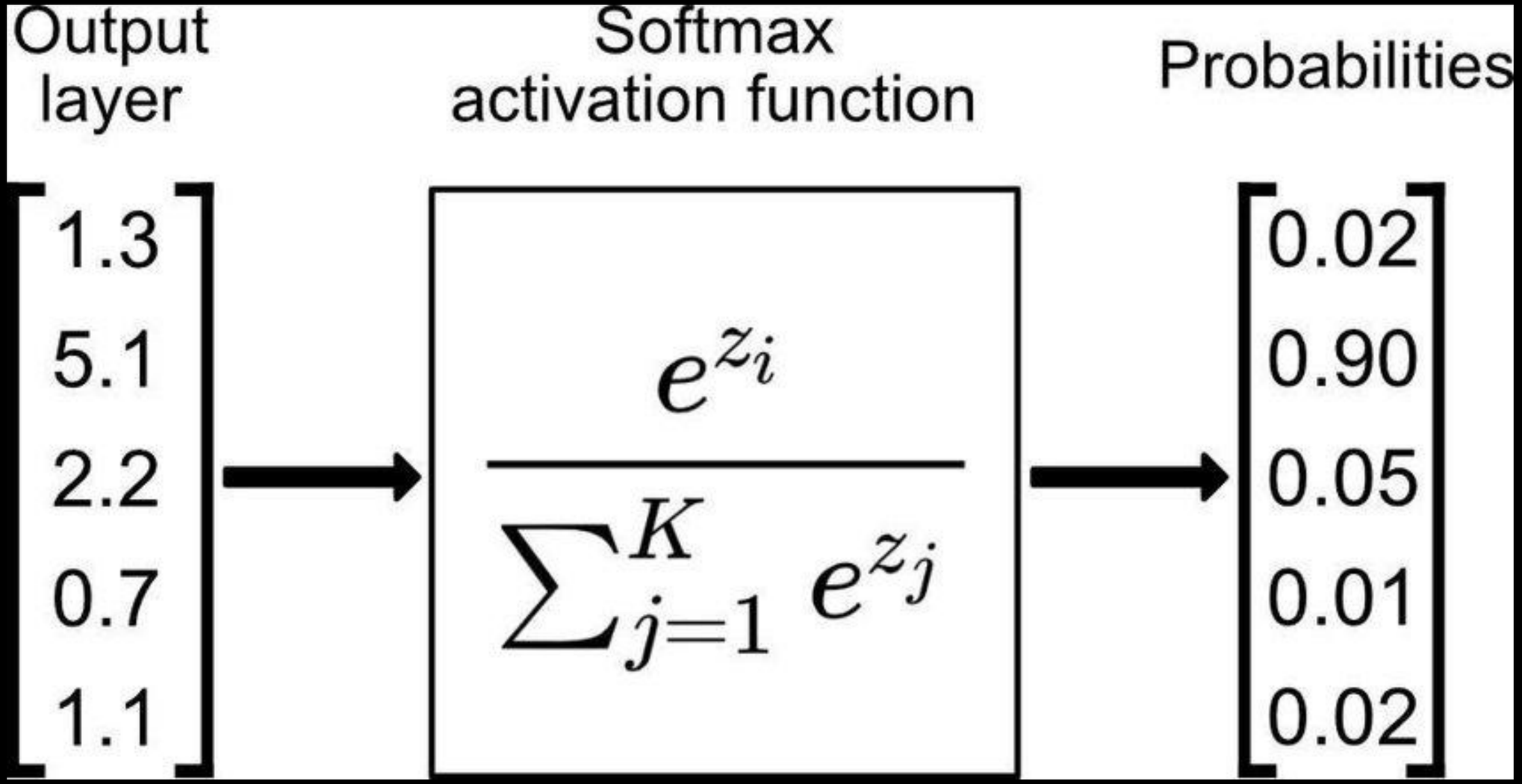


SIGMOID VS RELU



Source: https://towardsdatascience.com/activation-functions-neural-networks-1cbd9f8d91d6

SOFTMAX FUNCTION



Source: https://www.researchgate.net/figure/Working-principles-of-softmax-function_fig3_349662206

SCALING

- When training neural networks, it is important to **scale the data**
  - In regression problems, both the features and the target often have to be scaled
- Common options include **Standard Scaling** and **MinMax Scaling**
  - However, there are more types of scalers
- Standard scaling:
  - Transforms data such that the **mean is 0** and the **standard deviation is 1**
  - Useful for data that already (approximately) conform to a normal distribution
- MinMax scaling:
  - Transforms data to fall **between a specific range** (often between 0 and 1)
  - Useful for data that has a **known minimum and maximum** (e.g., images, percentages (if all percentages are generally plausible values))
  - **More sensitive to outliers** than standard scaling

SCALING

- Risk of **data leakage**
  - Fit the scaler **only to the training data**
  - Then **transform all datasets** (training, validation, and test)
- Remember to **inverse transform** predicted values back to the original scale before evaluating performance

```
from sklearn.preprocessing import StandardScaler, MinMaxScaler


scaler = StandardScaler()  # or MinMaxScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)
```

SCALING

- Interaction with **activation functions**:
  - Standard Scaling is often paired with ReLU activation
  - MinMax Scaling can be paired with Sigmoid activation
  - However, this is not a general rule and can be experimented with
- Scaling as a **hyperparameter**
  - Try different combinations of scalers and activation functions and see what works best
  - You can also experiment with scaling the features differently than the target
- **Implementation**:
  - See StandardScaler and MinMaxScaler from scikit-learn (sklearn)
  - For MinMax scaling with known maximum and minimum: tranform „manually“ (e.g., by dividing pixel values by 255.0)

PROJECTS MILESTONES

30.10.	Present your Ideas
06.11.	Form Groups
13.11.	Literature Review
20.11.	Dataset Characteristics

Deadline for completing the repo sections: 23.11.

27.11.	Individual Feedback Sessions
04.12.	Baseline Model Estimation
11.12.	Definition of Model Evaluation

Deadline for completing the repo sections: 14.12.

18.12.	Individual Feedback Sessions
15.01.	Project Presentations, Part I
22.01.	Project Presentations, Part II

Submission deadline for the documented repo: 30.02.

Projects

TASKS UNTIL NEXT WEEK

- Complete Project Proposals and discuss them in Mattermost
- Complete the learning material from the course handbook
- Complete assignment notebooks from the course handbook