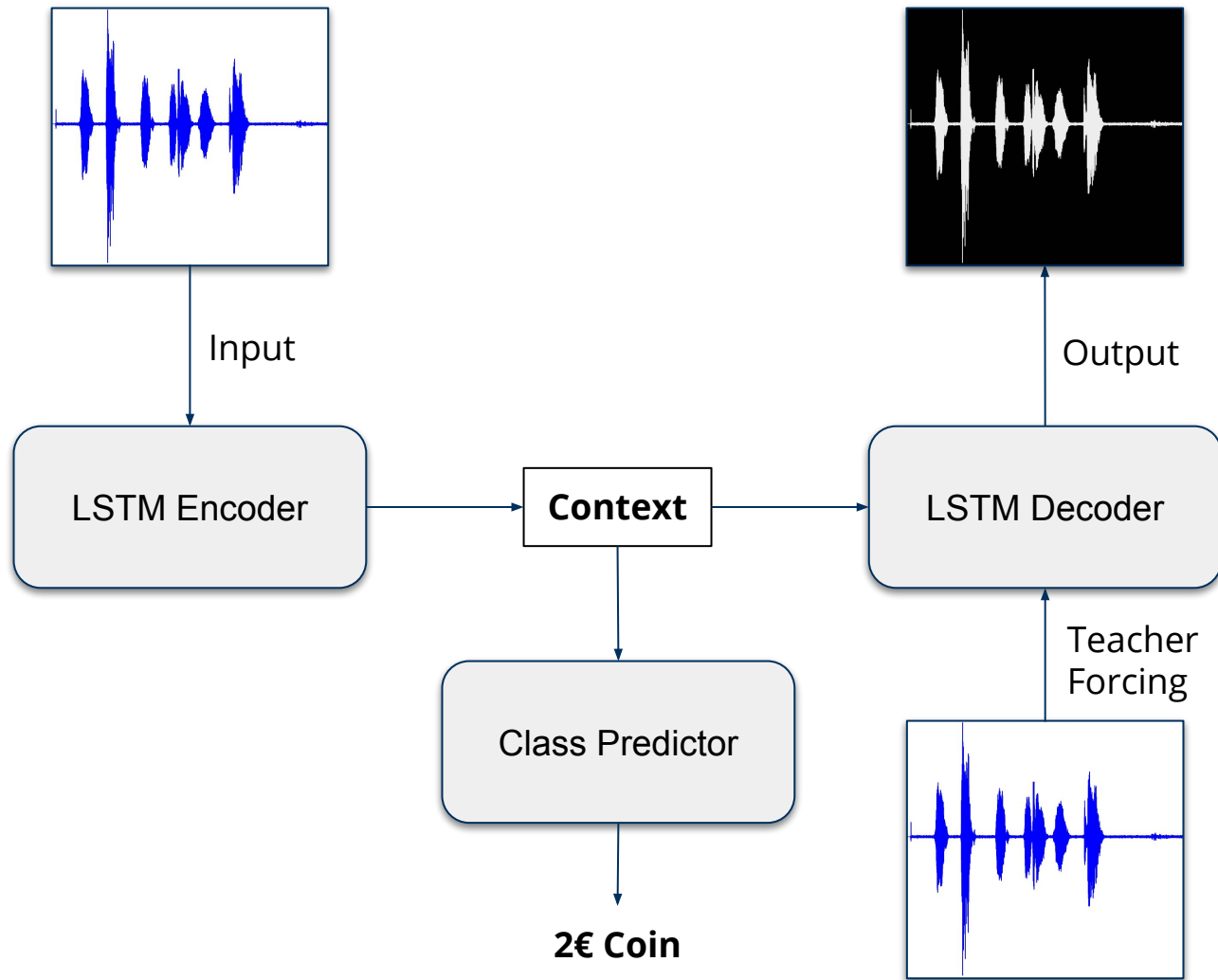# Komplexpraktikum Münzen

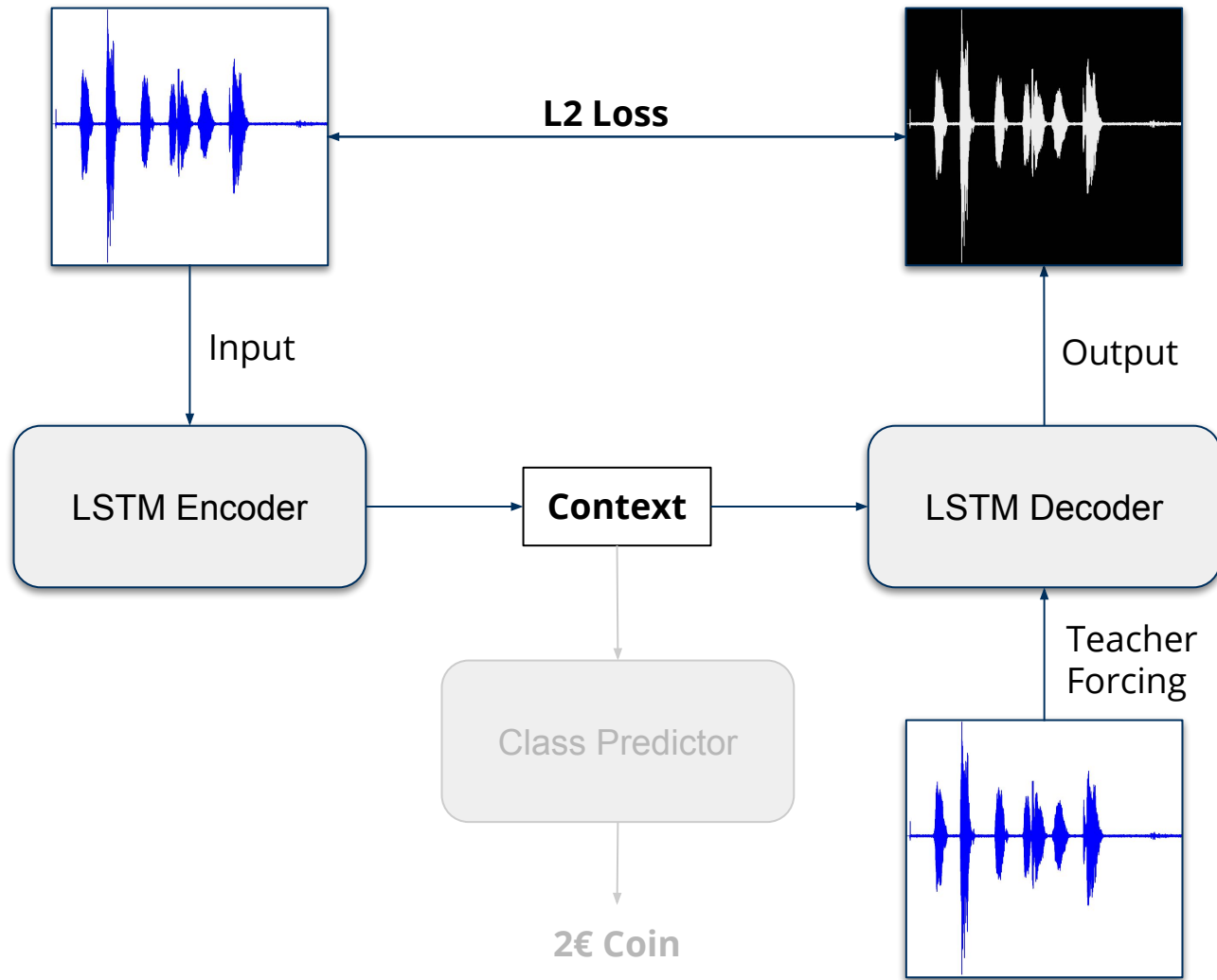Felix Meyer, Marvin Arnold, Remke Albrecht

Problem

- long term goal: identify machine failures using sound

- preparatory work: identify different types of coins using ultrasound
- coin types: 1ct, 2ct, 5ct, 20ct, 50ct, 1€, 2€

- traditional method: identify characteristic frequencies, check for these on new examples

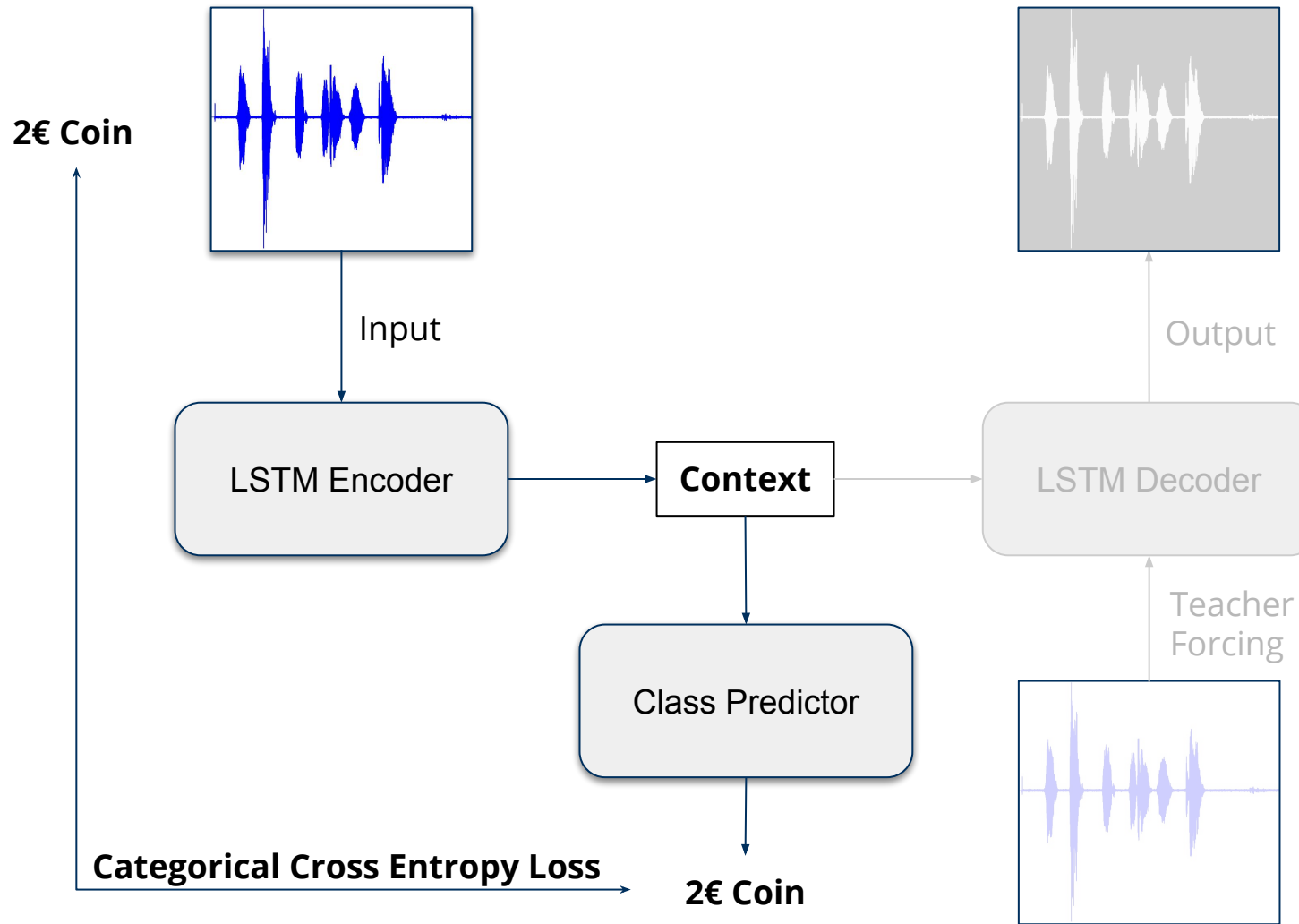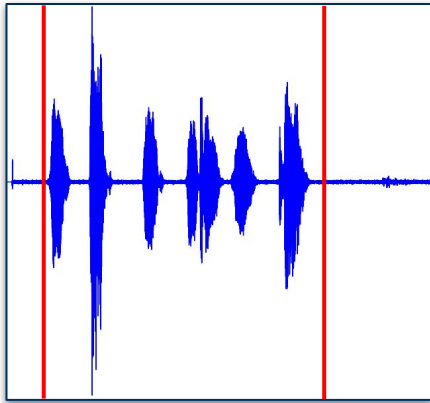- our method: use machine learning to let the model learn the characteristic frequencies by itself

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concept

Architecture

Training - Step 1

Training - Step 2

2€ Coin

Input

LSTM Encoder

Context

Output

LSTM Decoder

Teacher Forcing

Class Predictor

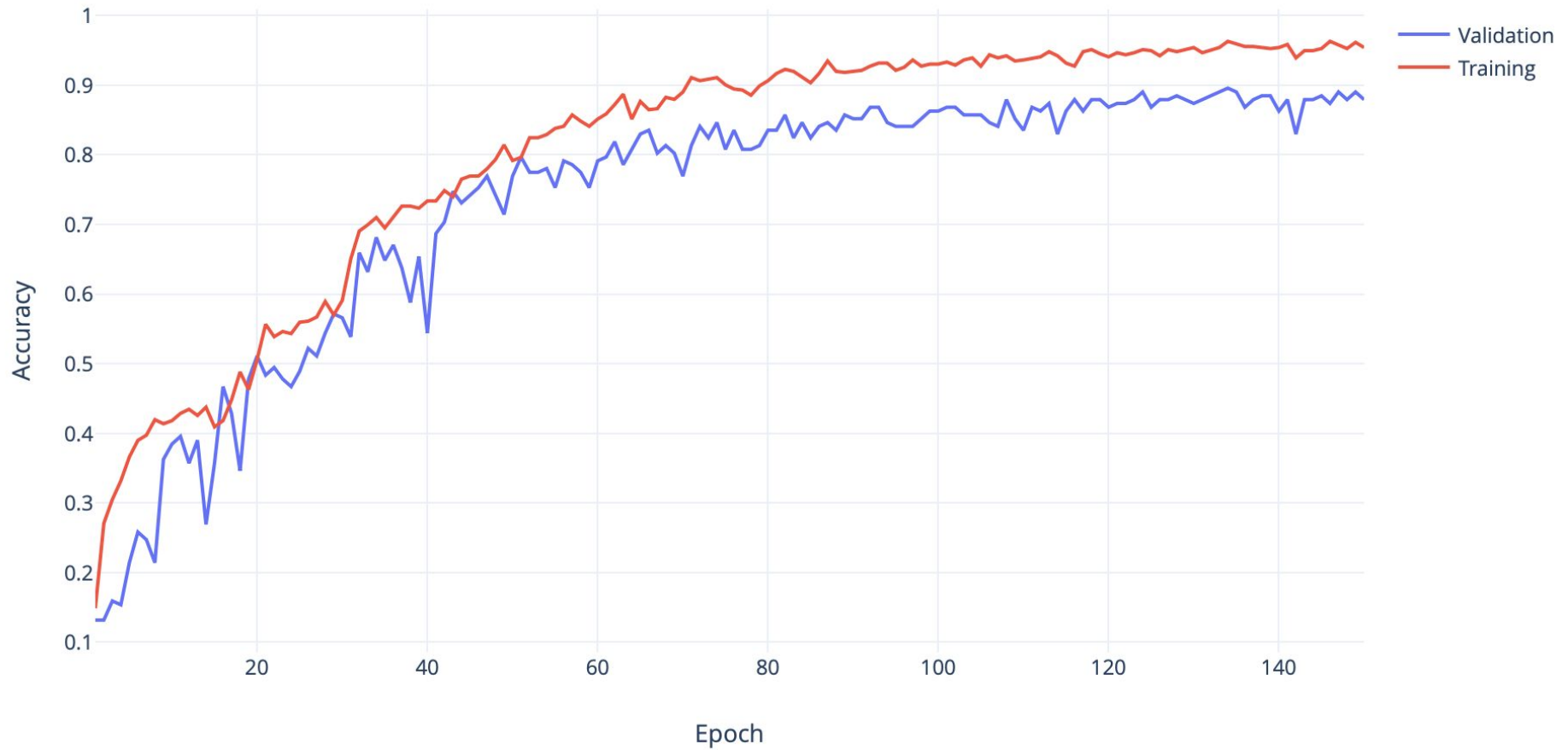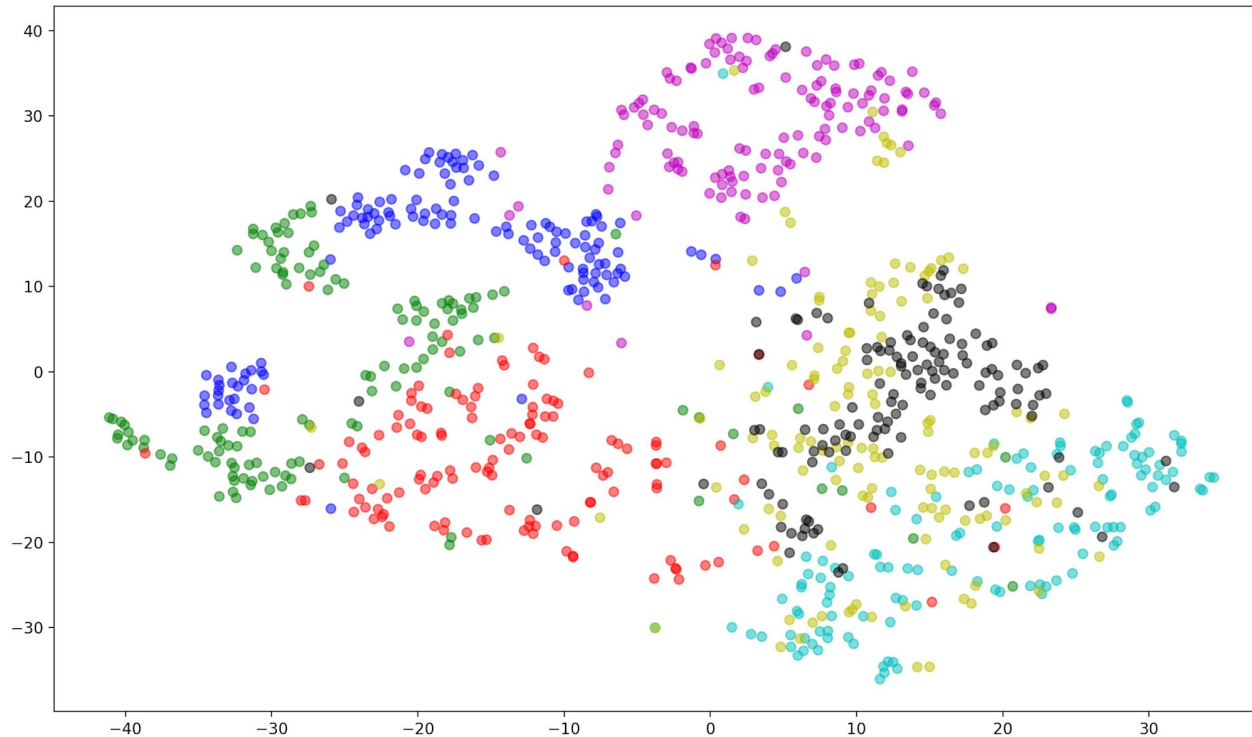**Categorical Cross Entropy Loss**

2€ Coin

Data Preparation

- trim audio signal to cut away silence (dB threshold)

- only use every n-th value for performance

- normalize signal to value range [-1, 1]

- sample same amount of examples from each class

- random batch shuffling
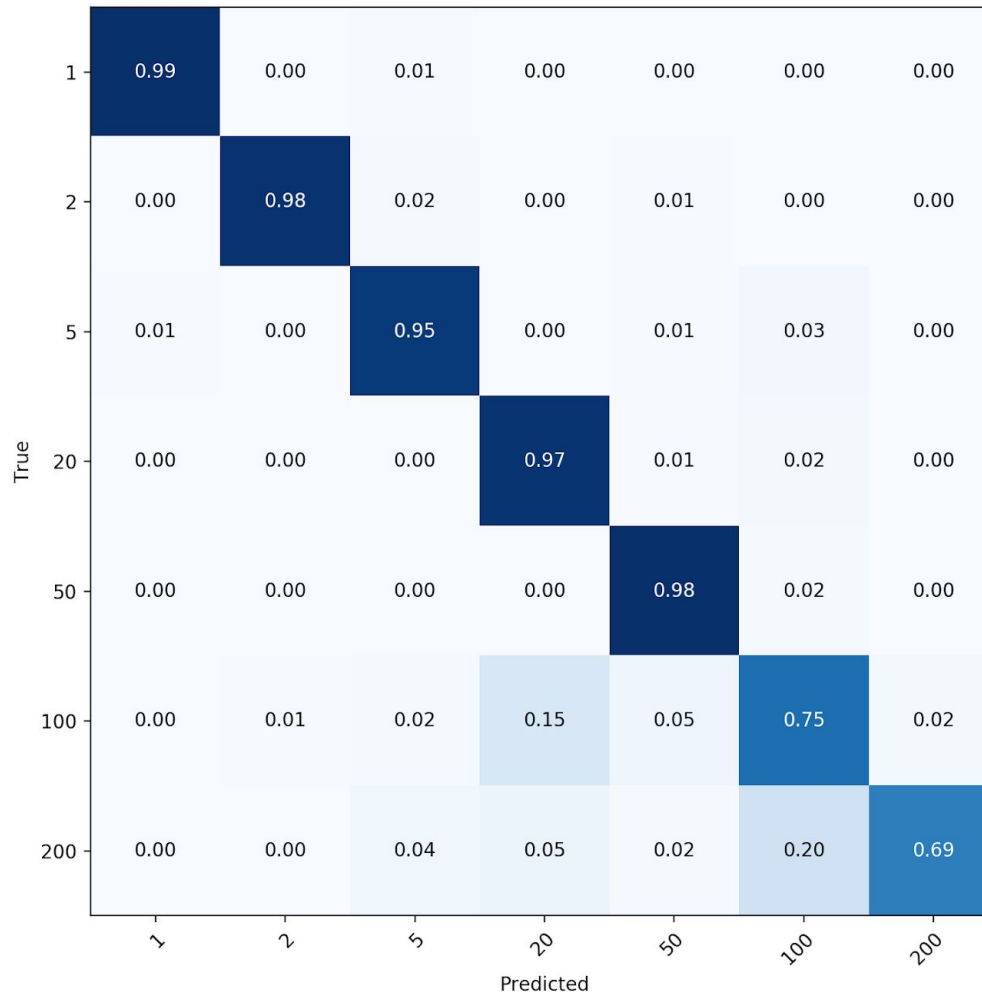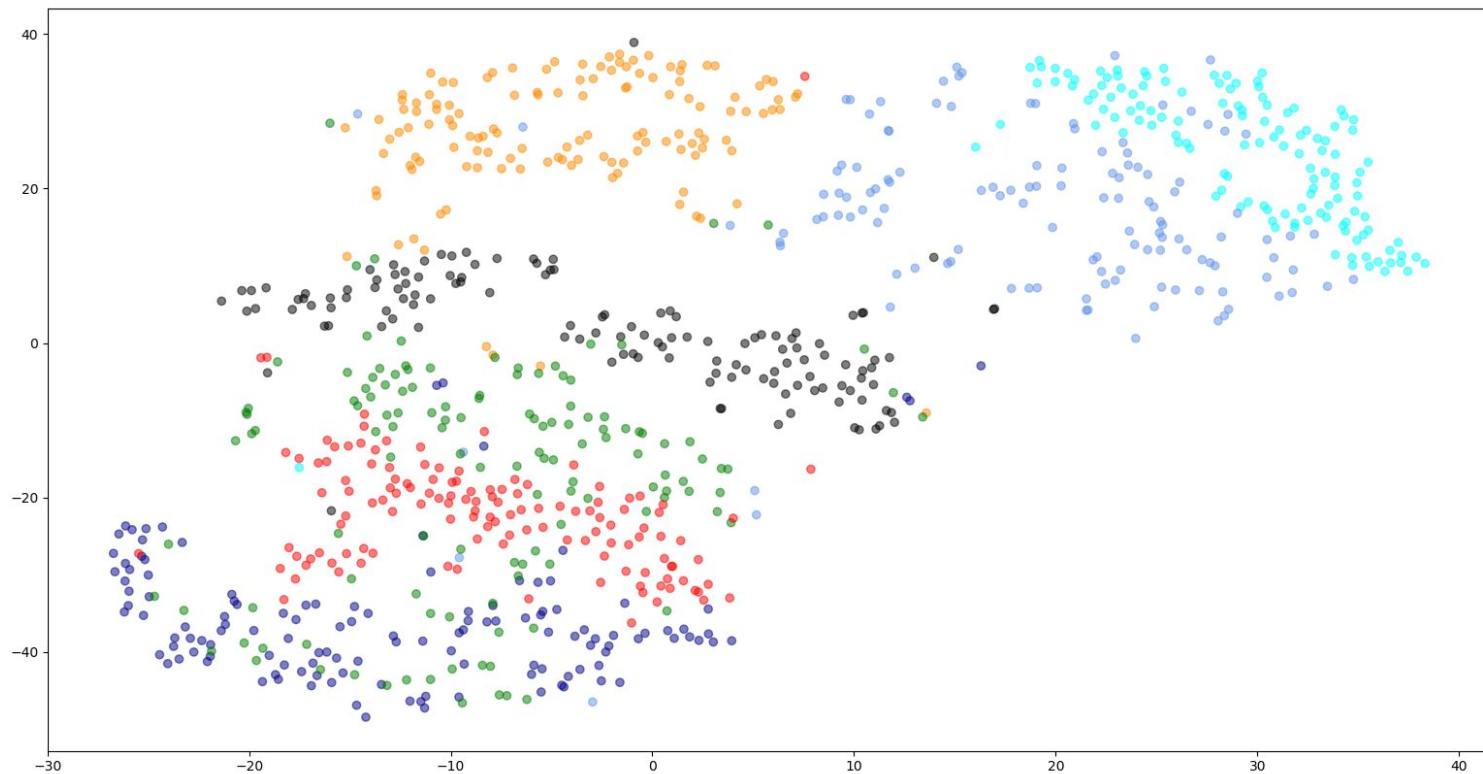
Results

TSNE - Plot

1ct - blue, 2ct - green, 5ct - red, 20ct - cyan, 50ct - magenta, 1€ - yellow, 2€ - black
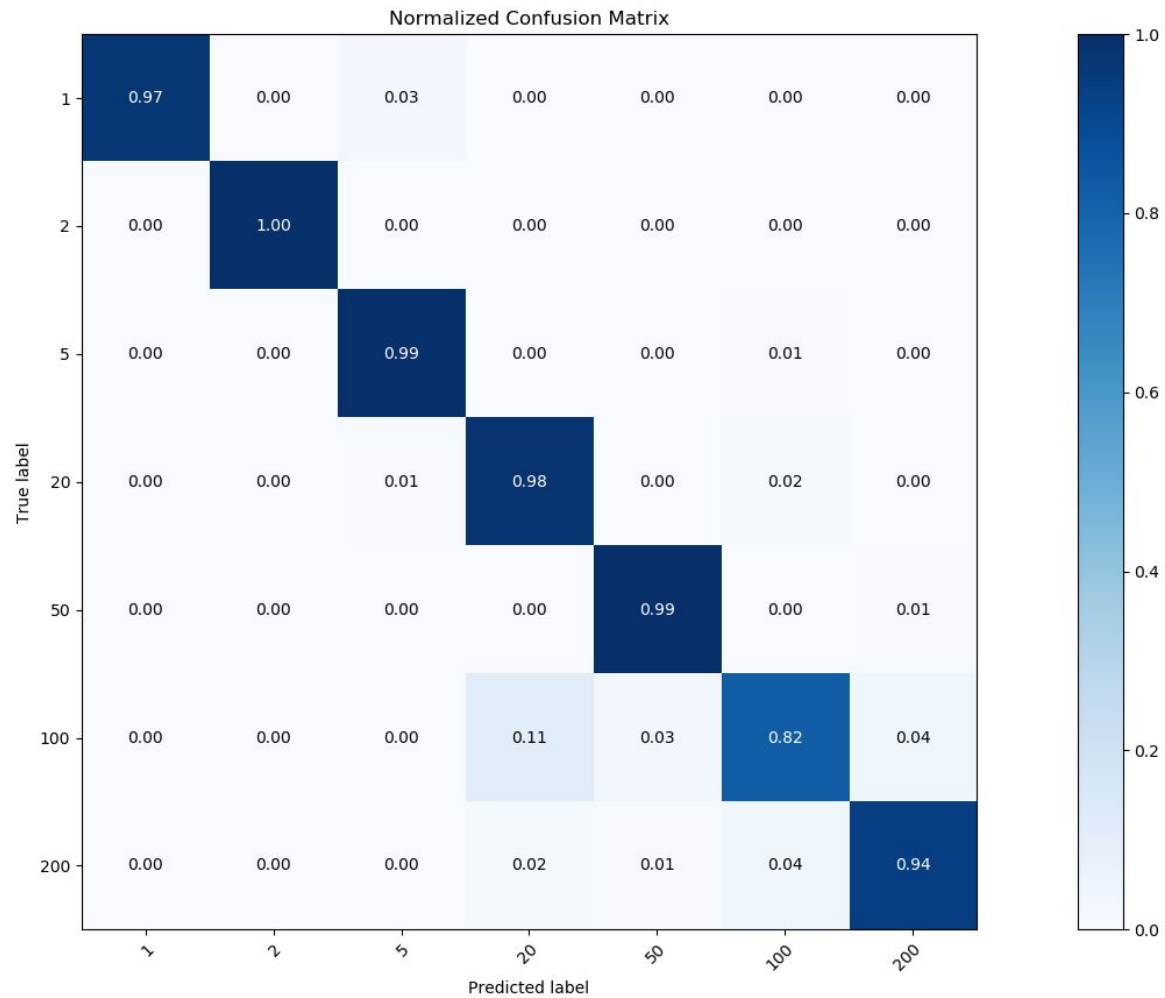
Confusion Matrix

TSNE - Plot

1ct - blue, 2ct - green, 5ct - red, 20ct - cyan, 50ct - magenta, 1€ - yellow, 2€ - black

Confusion Matrix

ROC Curve

Receiver operating characteristic example