

Lab Notebook

Pupil Reconstruction

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1 Amplitude and Phase Reconstruction

16 February 2024

- Create new github branch: `AmpPhaseReconstructionRetraining`
 - Download the following the files from Morgana:
 - `superK_slmcube_20230625_complsines-01sp_07`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file00`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file01`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file02`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file03`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file04`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file05`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file06`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file07`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file08`
 - `slmcube_20230625_complsines-01sp_07_PSFWFs_file09`
 - Data processing for Fully Convolutional NN training
 - One fast experiment for each file: very good results, around 0.05 validation mse
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19 February 2024

- Remove normalization from amplitude and phase for the fully connected experiments

EXPERIMENT NewFC10000-Processed 2

HYPERPARAMETERS:

***ARCHITECTURE HYPERPARAMETERS:**

- Fully Connected
- Input shape: 1320
- Output shape: (2, 96, 96)
- Hidden layers: [2000, 2000, 2000, 2000]
- Regularizer: None
- Hidden Layers Activation: relu
- Output Layer Activation: linear
- Batch Normalization: False
- Dropout: False, 0.2

***COMPILE HYPERPARAMETERS:**

- Optimizer: ADAM lr=0.001, beta_1=0.9, beta_2=0.999
- Loss Function: MSE
- Metric: MSE

***TRAINING HYPERPARAMETERS :**

- Epochs: 200
- Batch size: 64
- Callbacks:
 - ReduceLROnPlateau: MSE 10 x0.1
 - Early Stop: MSE 25

VISUALIZATION:***RESULTS :**

- Train MSE: 0.035130929201841354
- Validation MSE: 0.0786573588848114

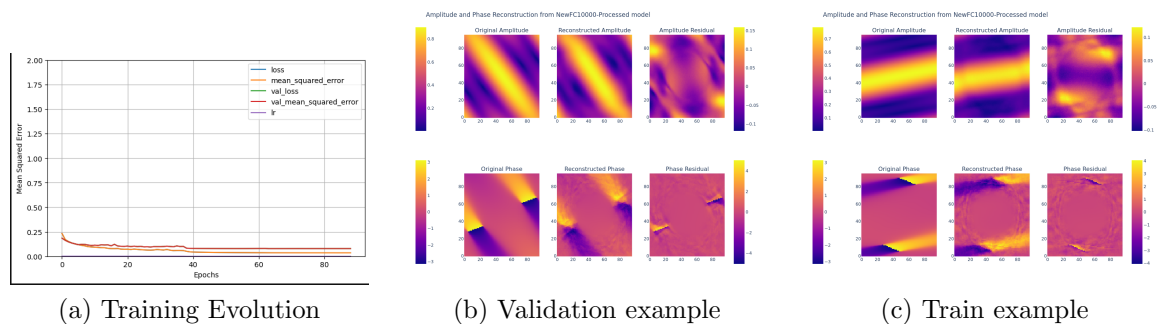


Figure 1: Results of training the model NewFC10000-Processed 2

EXPERIMENT NewFC30000-Processed-1

HYPERPARAMETERS:

***ARCHITECTURE HYPERPARAMETERS:**

- Fully Connected
- Input shape: 1320
- Output shape: (2, 96, 96)
- Hidden layers: [2000, 2000, 2000, 2000]
- Regularizer: None
- Hidden Layers Activation: relu
- Output Layer Activation: linear
- Batch Normalization: False
- Dropout: False, 0.2

***COMPILE HYPERPARAMETERS:**

- Optimizer: ADAM lr=0.001, beta_1=0.9, beta_2=0.999
- Loss Function: MSE
- Metric: MSE

***TRAINING HYPERPARAMETERS:**

- Epochs: 200
- Batch size: 64
- Callbacks:
 - ReduceLROnPlateau: MSE 10 x0.1
 - Early Stop: MSE 25

VISUALIZATION:

***RESULTS :**

-Train MSE: 0.0357743538916111

-Validation MSE: 0.057852283120155334

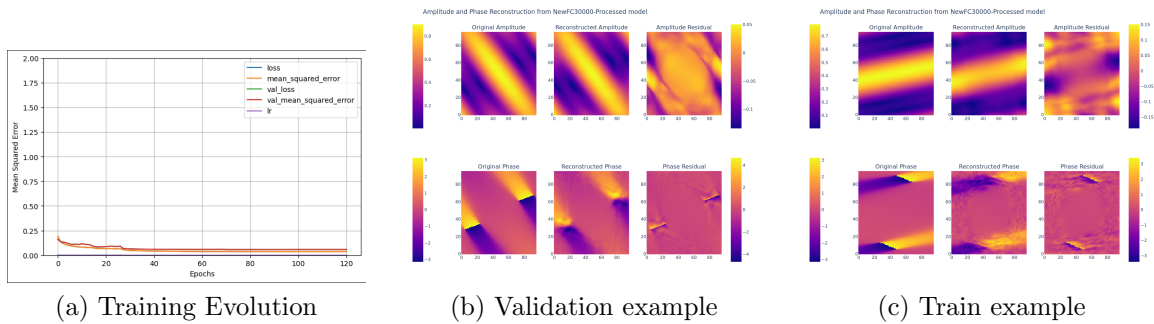


Figure 2: Results of training the model NewFC30000-Processed-1

2 PSF Reconstruction