# Image Reconstruction Using Event Data

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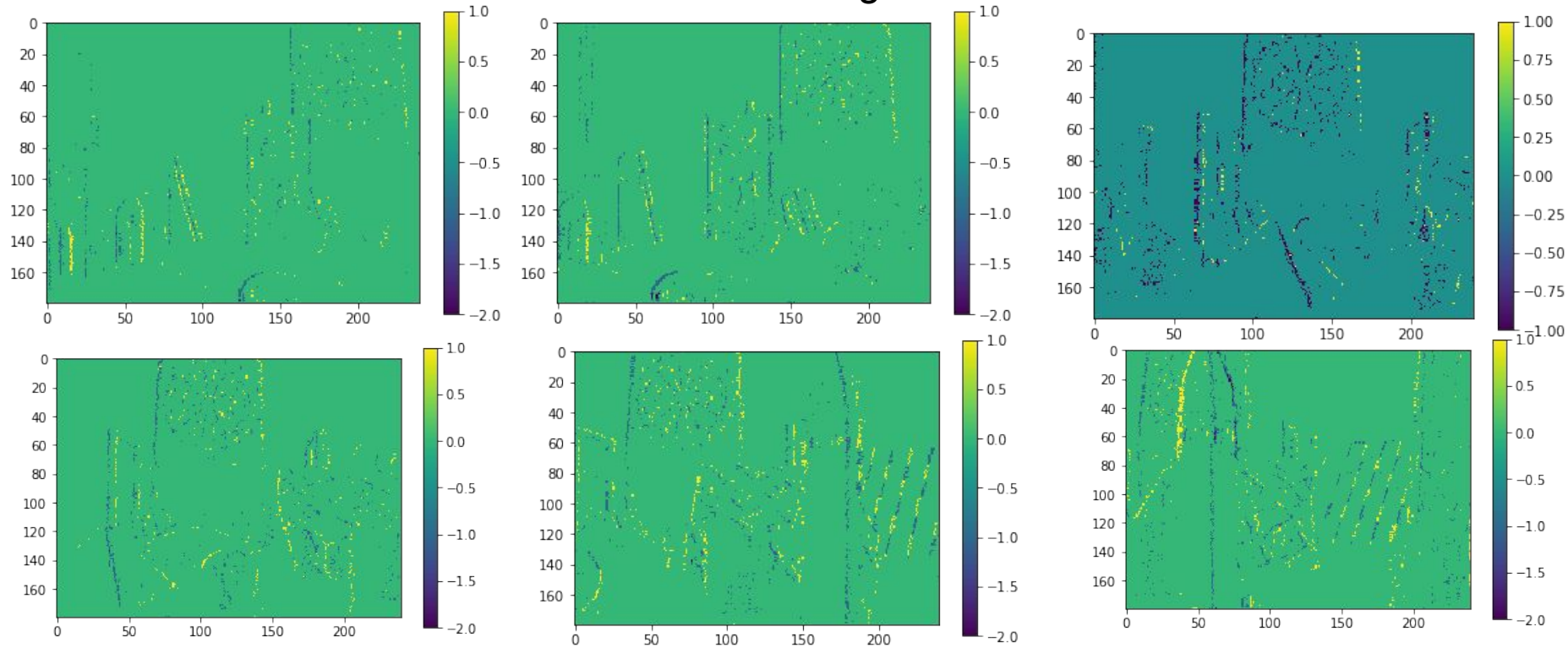
# 1.SLIDER_DEPTH  DATASET

**Reference:** *http://rpg.ifi.uzh.ch/davis_data.html*

# EVENT FRAMES

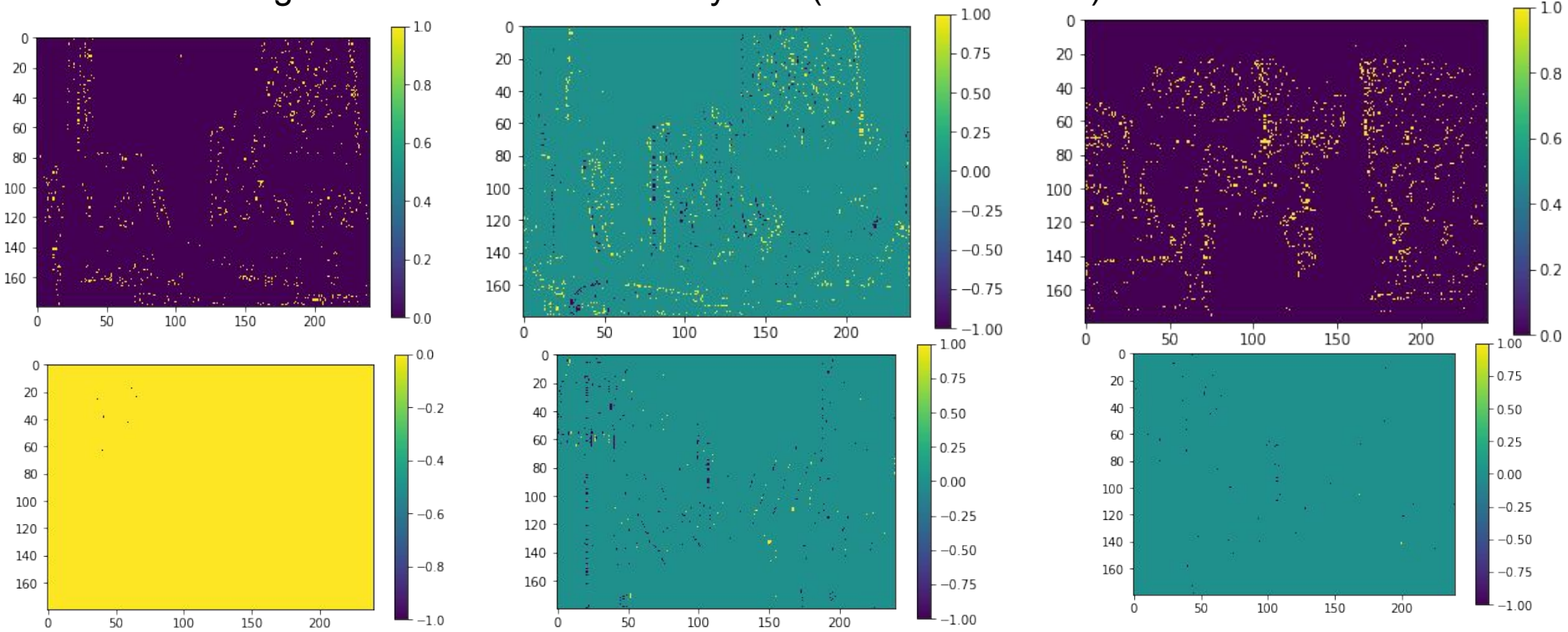
Generated by dividing the event data between every two given image timestamps into 10 uniform intervals. Thus we get 86x10 = 860 event frames



(Sequence from Left to Right) : 0 , 81 , 330 , 458 , 635 , 766

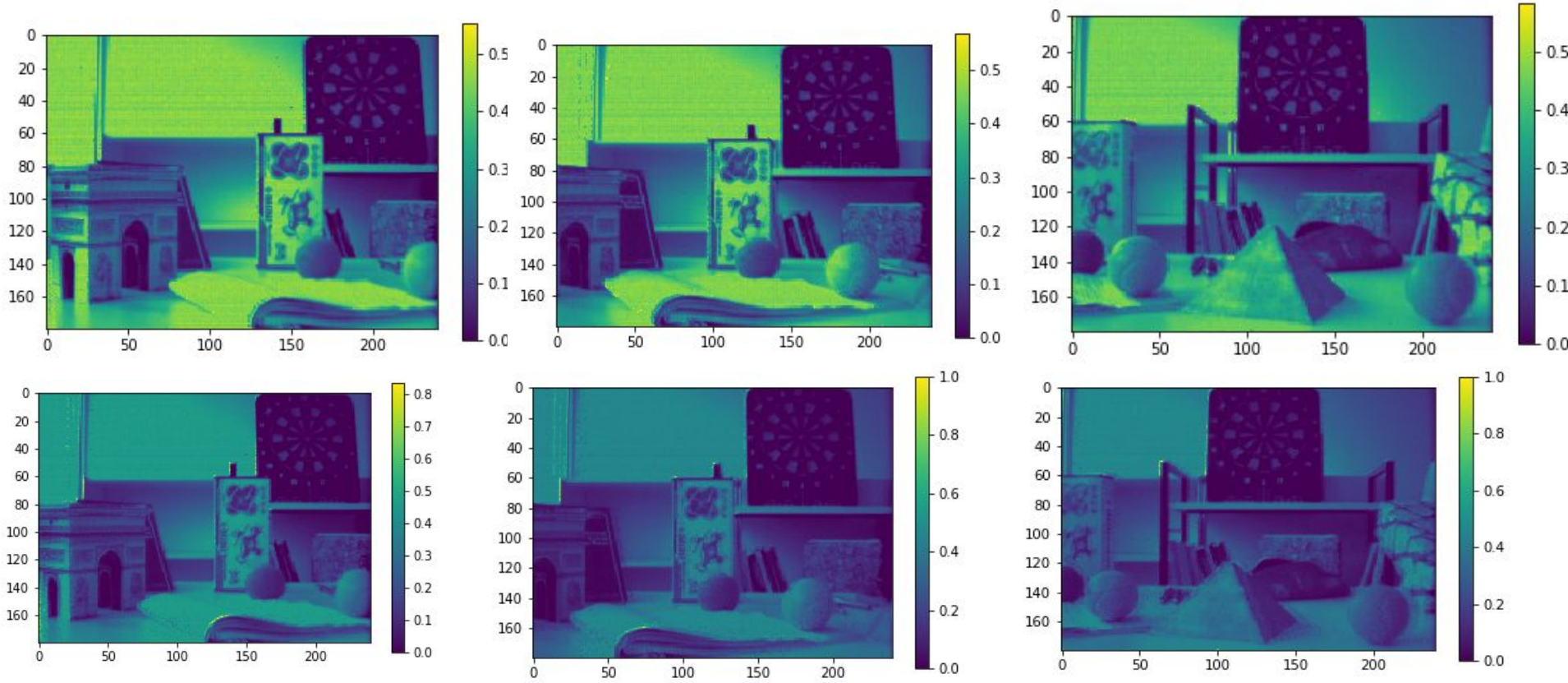
*SLIDER_DEPTH DATASET*

The event frames were not clear that are corresponding to the last uniform interval of event data between two images, after which the event data following the new image starts.
Also there were much sparsity in the later images because the number of events recorded between two images in that interval were very less (50-60 event data)

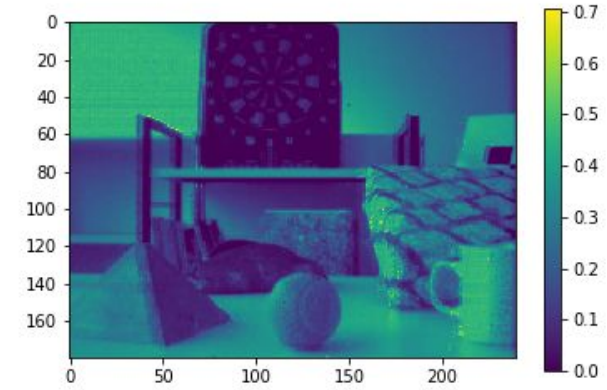
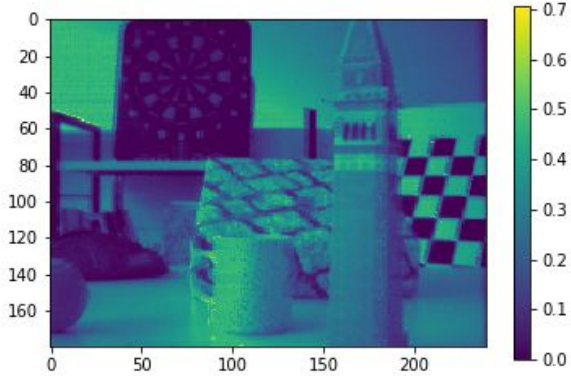
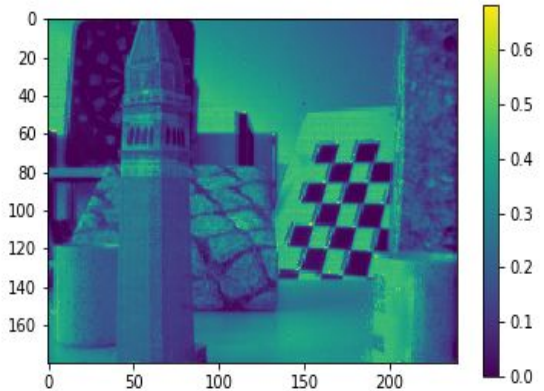
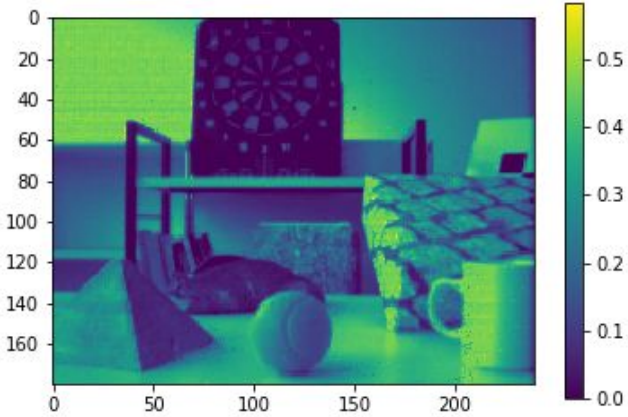
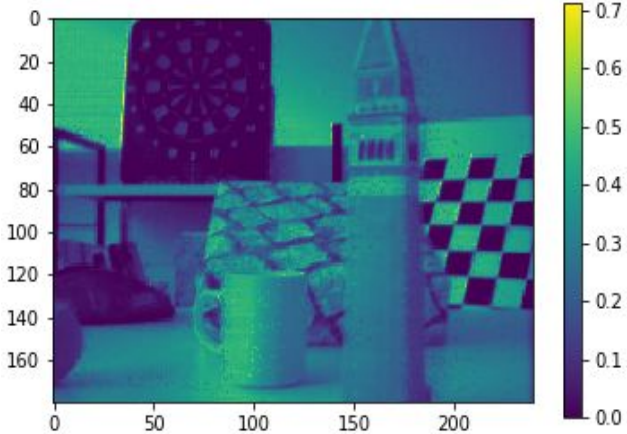
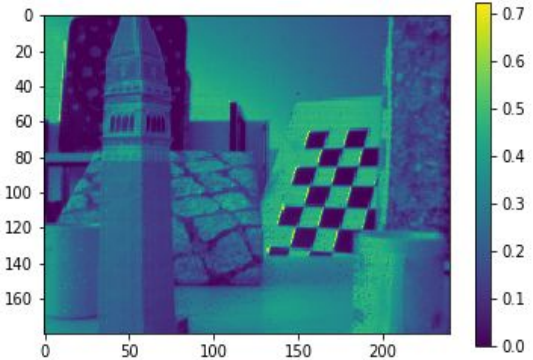


(Sequence from Left to Right) : 9 , 119 , 659 , 852 , 825 , 831

# Intermediate Image Frames Generated Using Forward & Backward Formula

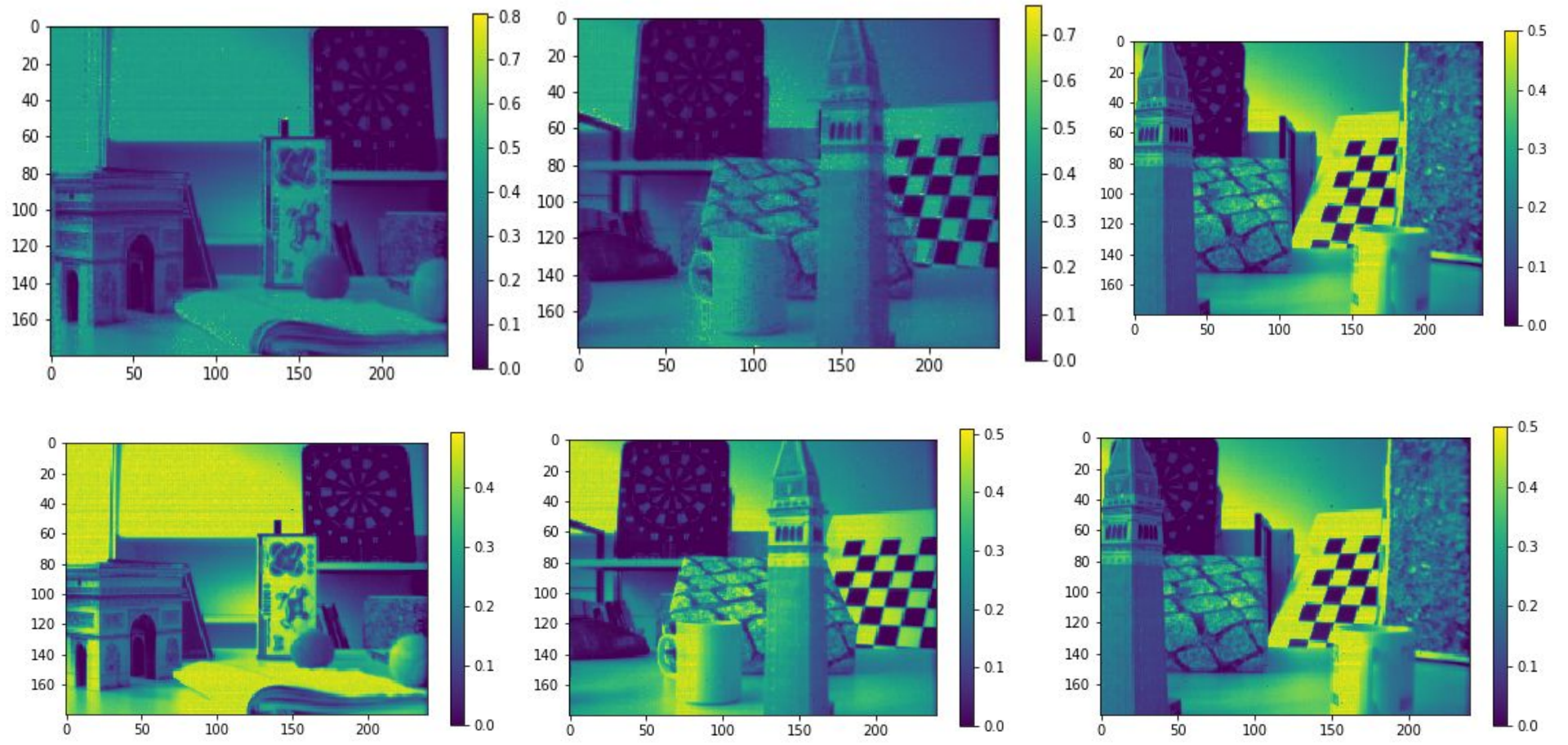


**UP**: Data **Down**: Label 0 , 81 , 330

**UP**: Data ; **Down**: Label

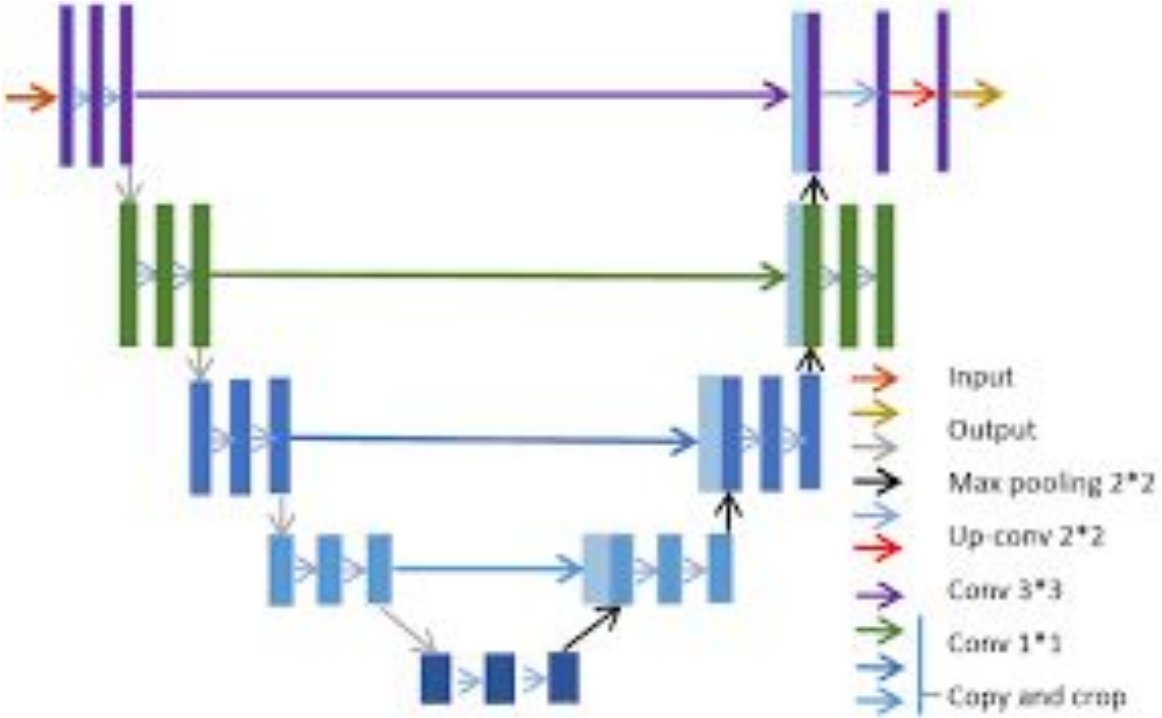
458 ; 635 ; 766



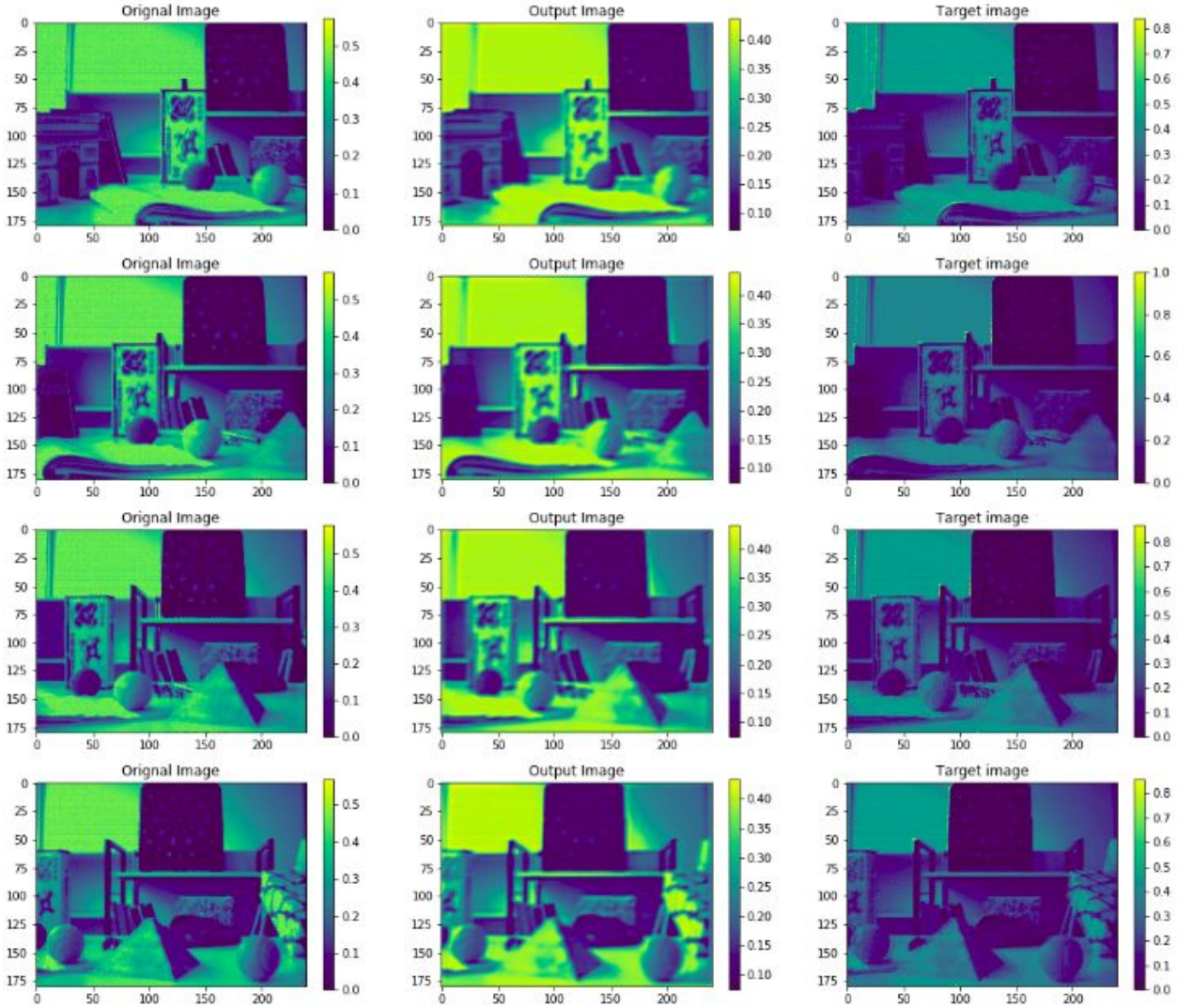
9 ; 659 ; 852

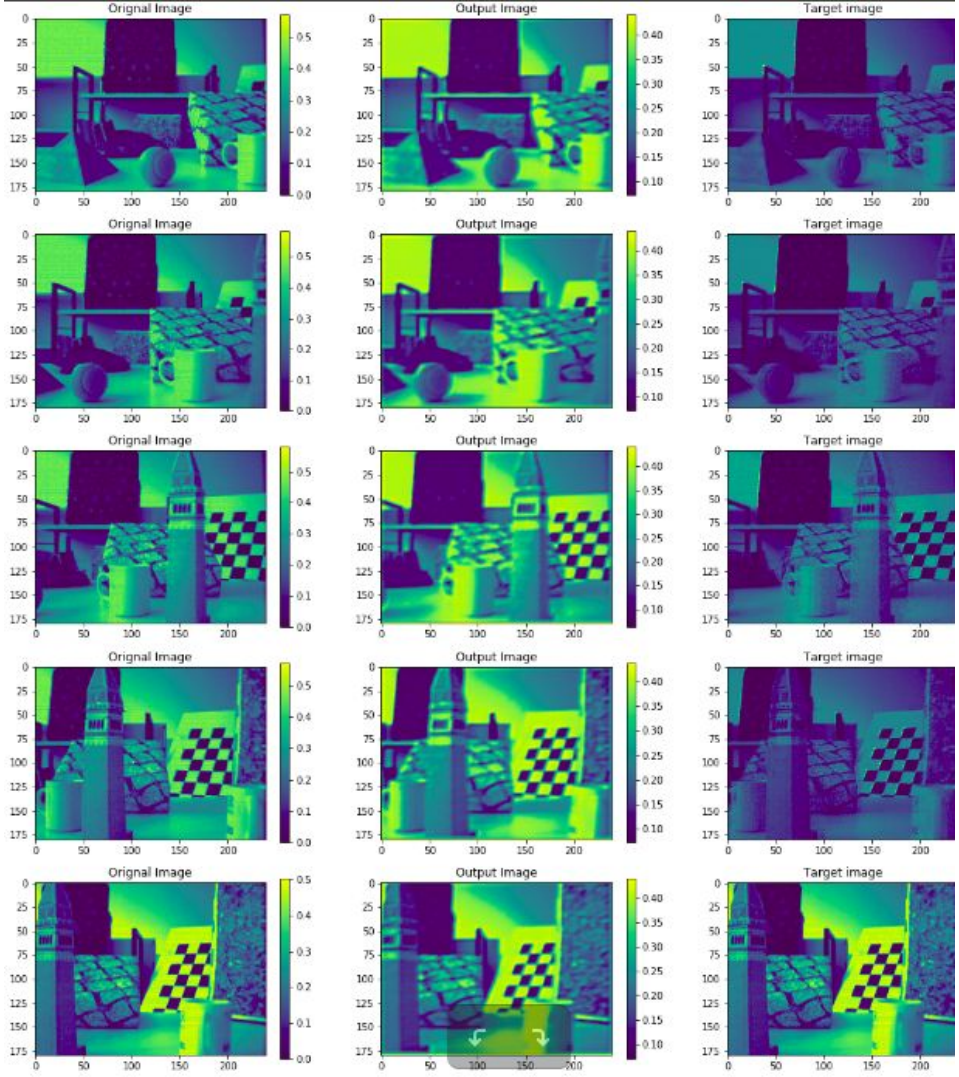
# TRAINING WITH A U-NET ARCHITECTURE

- U-Net Architecture was used to train a model where data is the images generated using forward formula, $I_n = I_0 \exp\{\gamma(E_1+E_2+...+E_n)\}$ and labels were generated using backward formula $I_n = I_m \exp\{-\gamma(E_{n+1} +...+ E_m)\}$. (m>n); $\gamma = 0.2$



# RESULTS


Orignal Image
Output Image
Target image
Orignal Image
Output Image
Target image
Orignal Image
Output Image
Target image
Orignal Image
Output Image
Target image


Orignal Image
Output Image
Target image
Orignal Image
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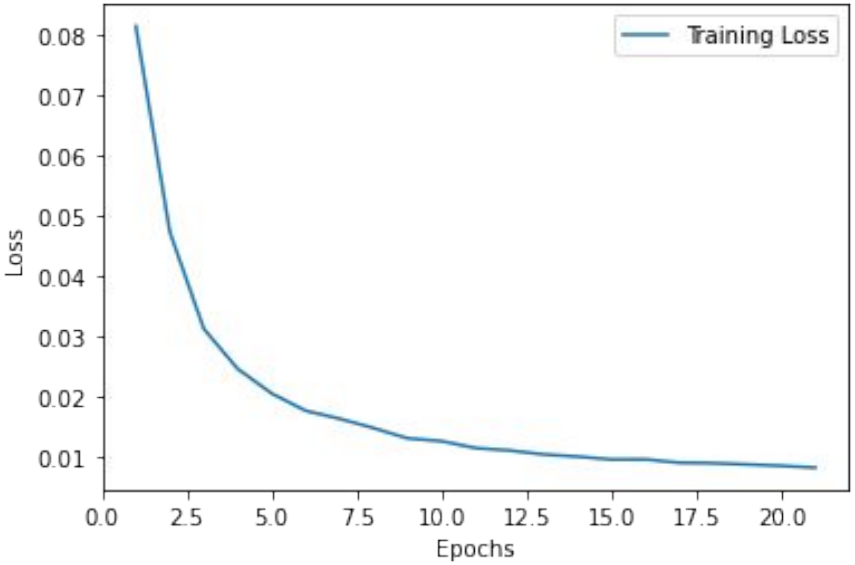
Target image
Orignal Image
Output Image
Target image
Orignal Image
Output Image
Target image
Orignal Image
Output Image
Target image

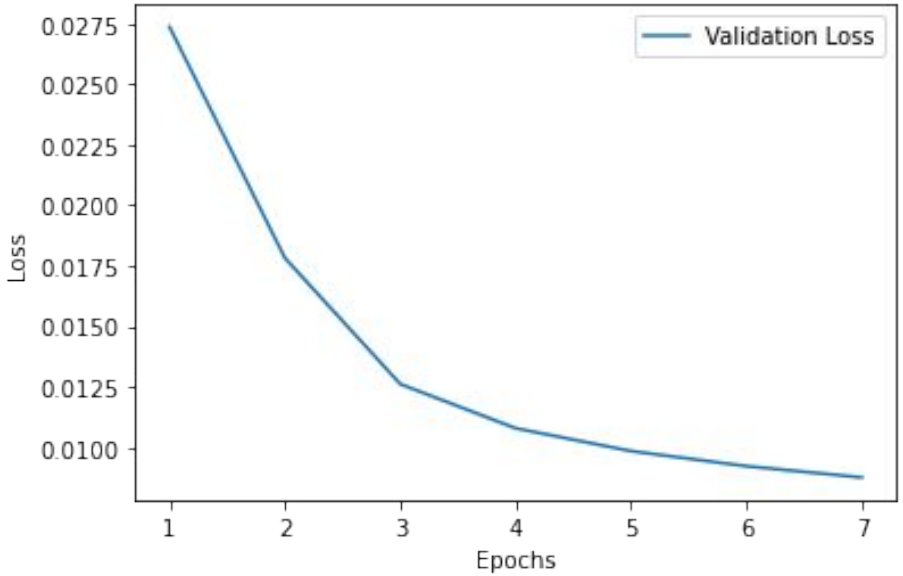
# Reconstructed Video (60 fps)

## Reconstructed

## Ground Truth

# Epochs vs Loss



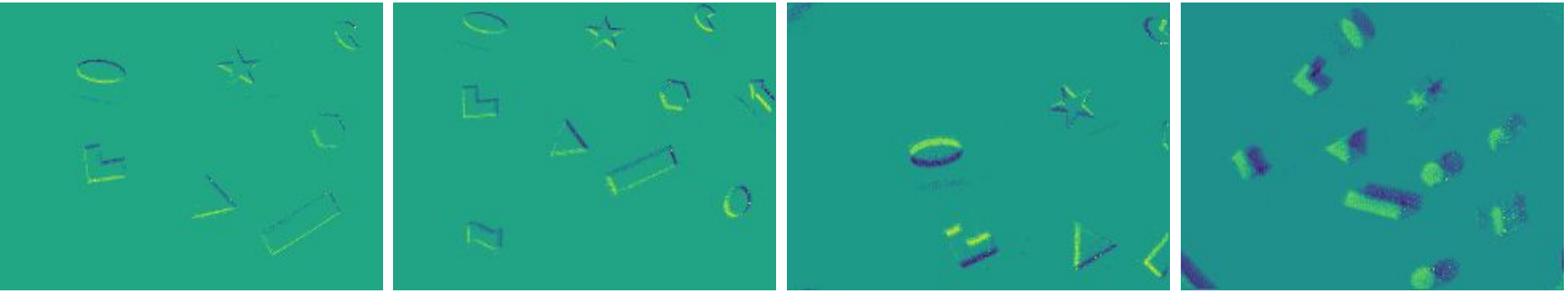



# 2. SHAPES_6DOF Dataset

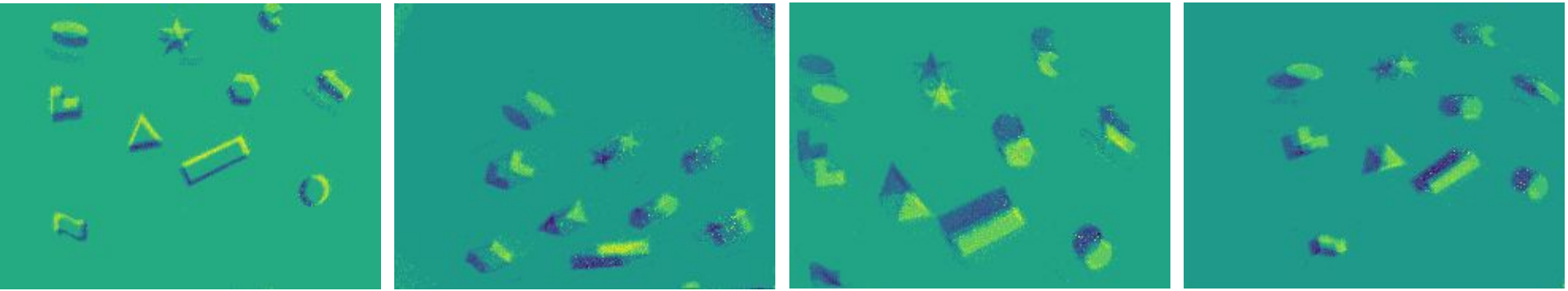
**Reference:** *http://rpg.ifi.uzh.ch/davis_data.html*

# EVENT FRAMES

4, 206, 409, 650

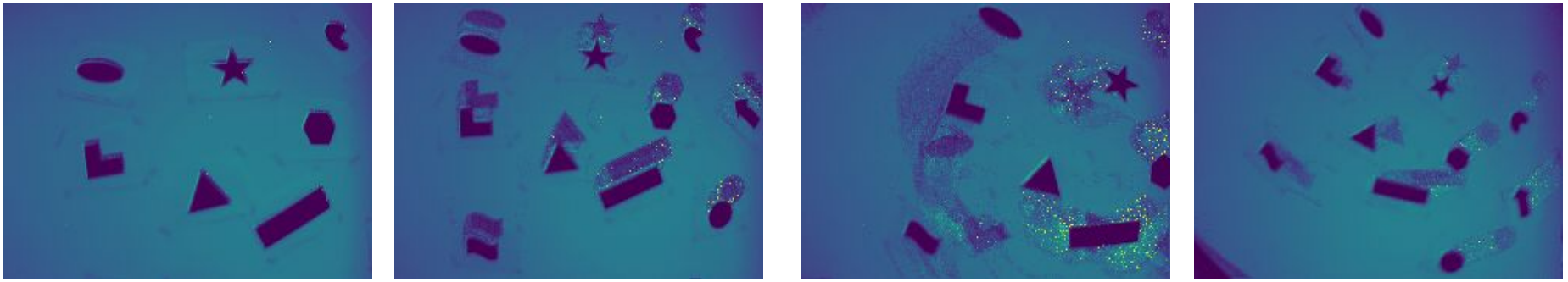


802, 967, 1100, 1321

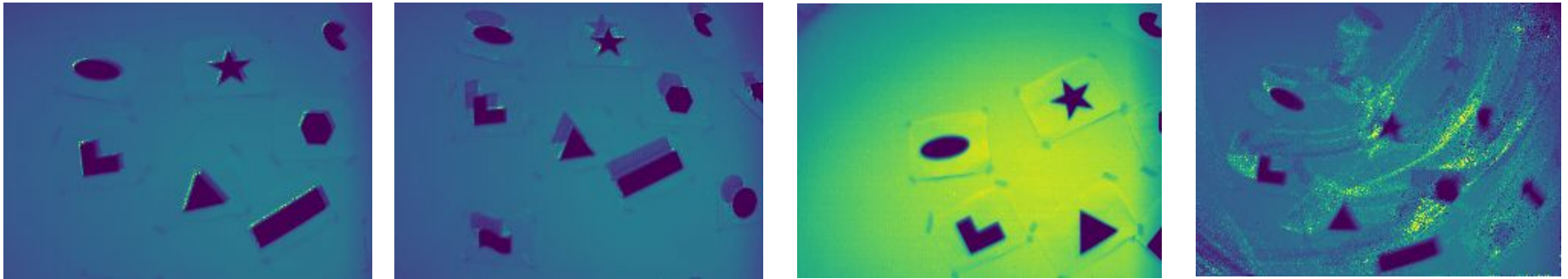


4 , 206 , 409 , 650

## Data

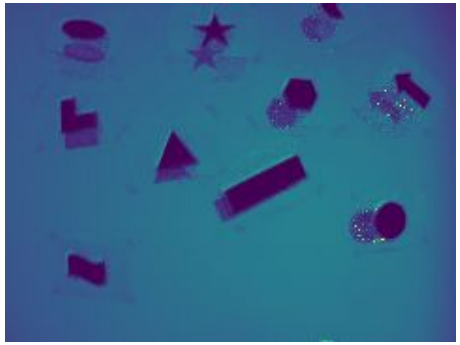
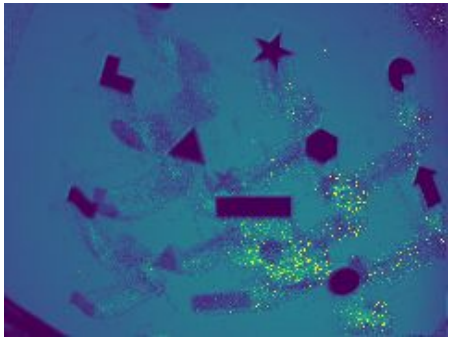
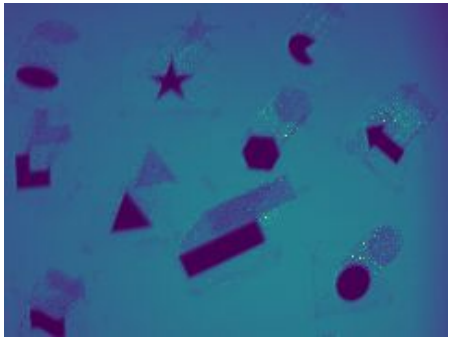
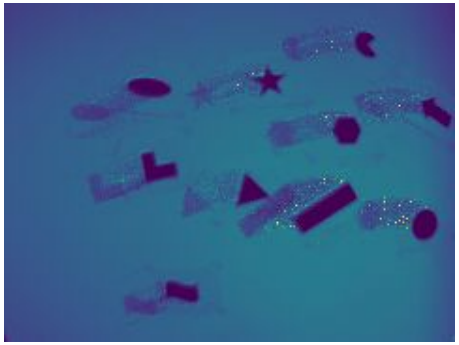


## Labels

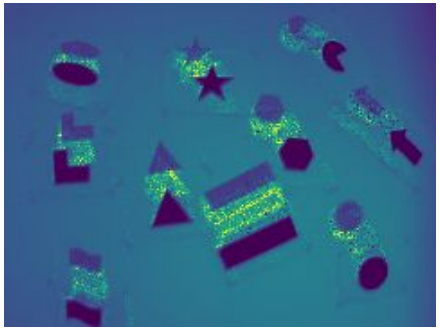
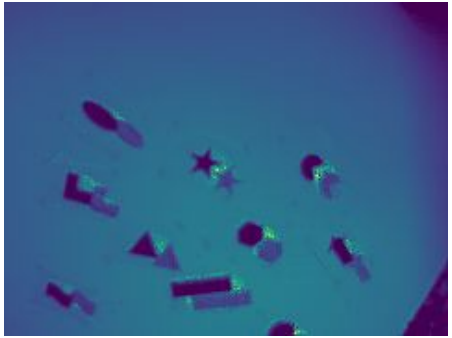
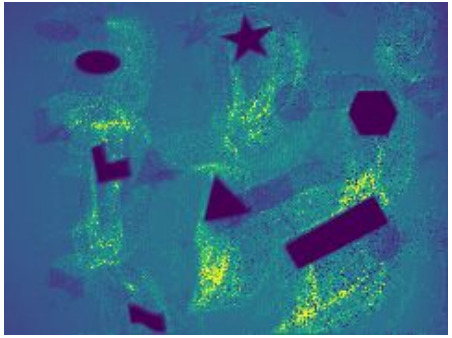
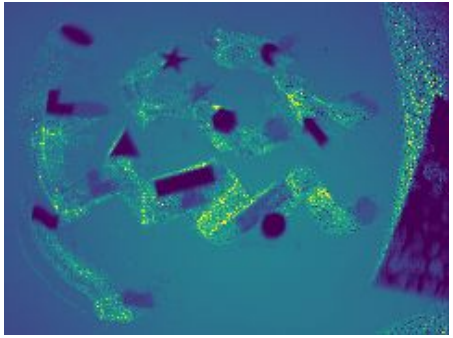


# Data

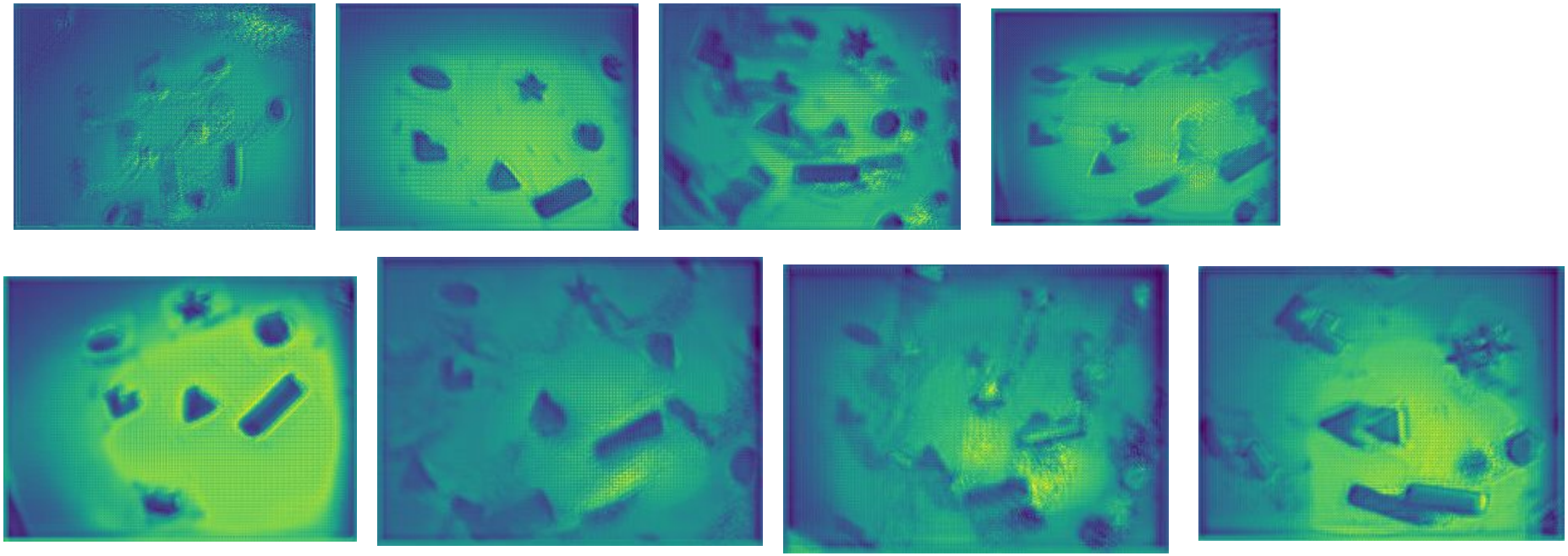
802, 967, 1100, 1321

# Labels

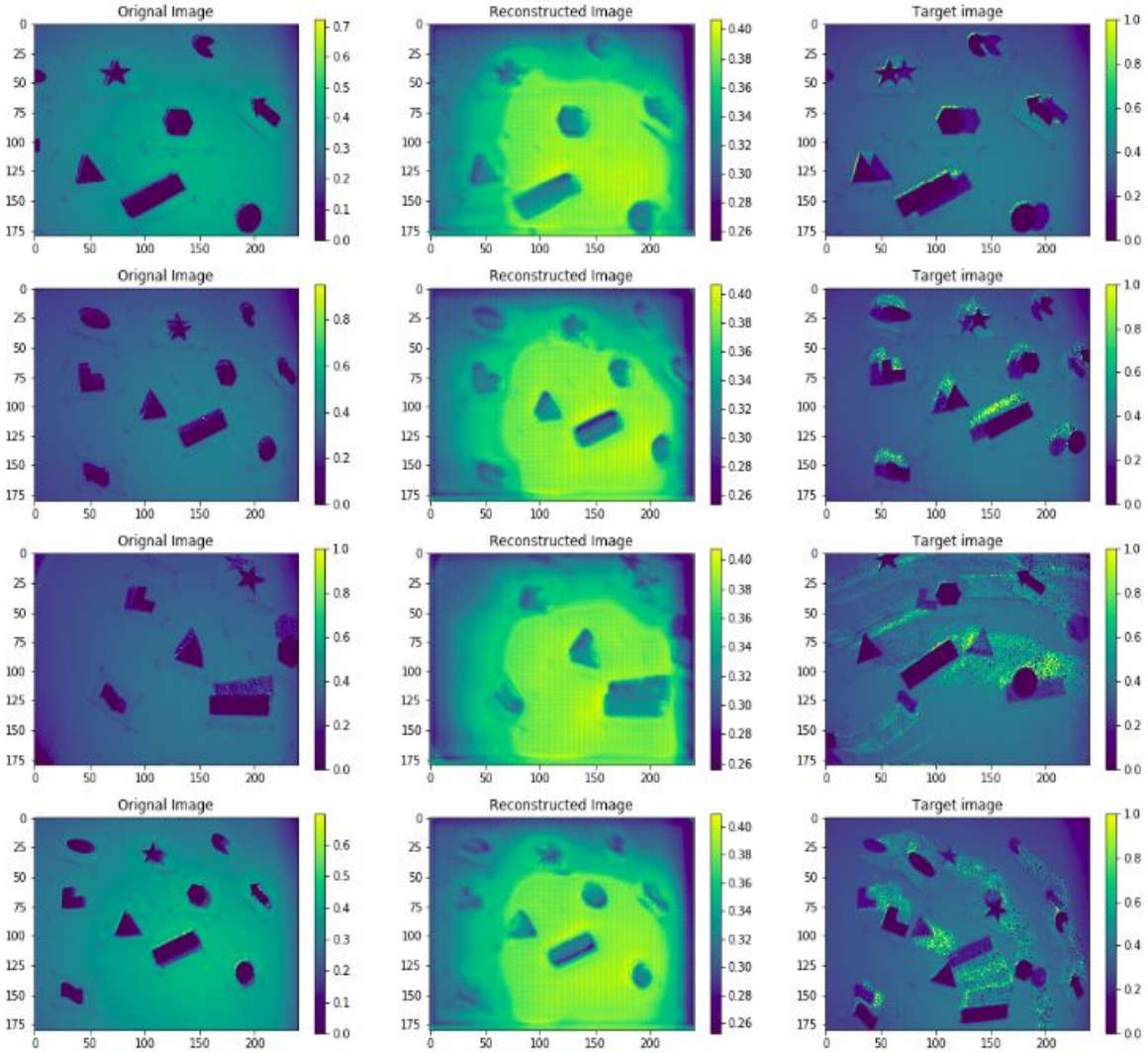
# Images from Validation Data During the time of Training



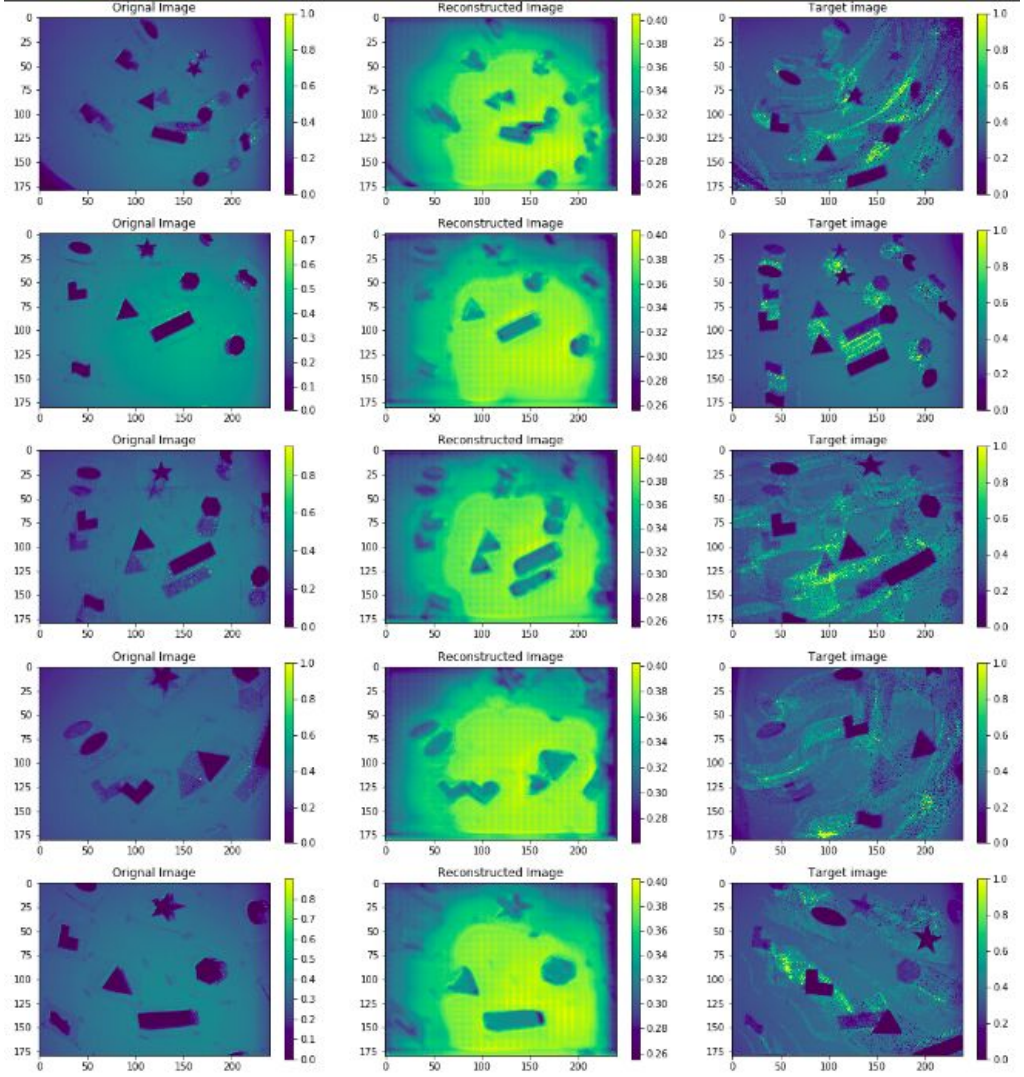
**2_0 , 5_3 , 5_4 , 8_6 , 11_9 , 14_8 , 17_7 , 20_10**

**I_j ( i : epochs , j : Validation Iterations)**

# Results




**50, 200 , 350 , 500 , 650 , 1200 , 1300**

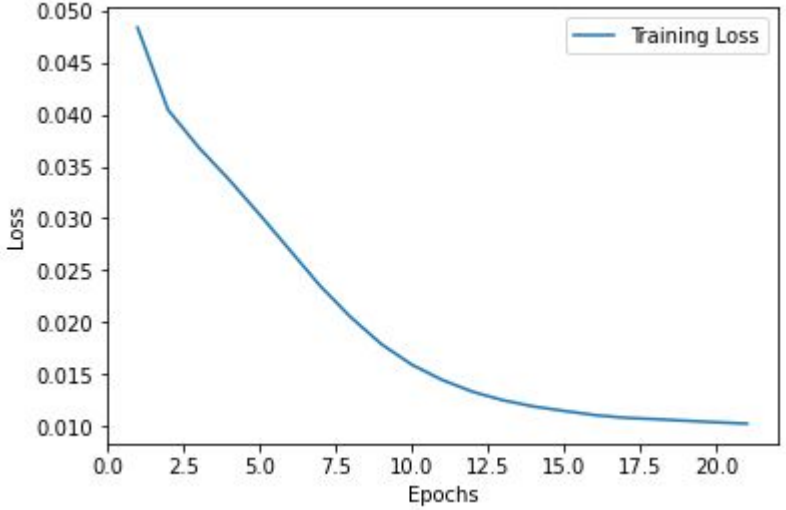

Orignal Image
Reconstructed Image
Target image
Orignal Image
Reconstructed Image
Target image
Orignal Image
Reconstructed Image
Target image
Orignal Image
Reconstructed Image
Target image
Orignal Image
Reconstructed Image
Target image

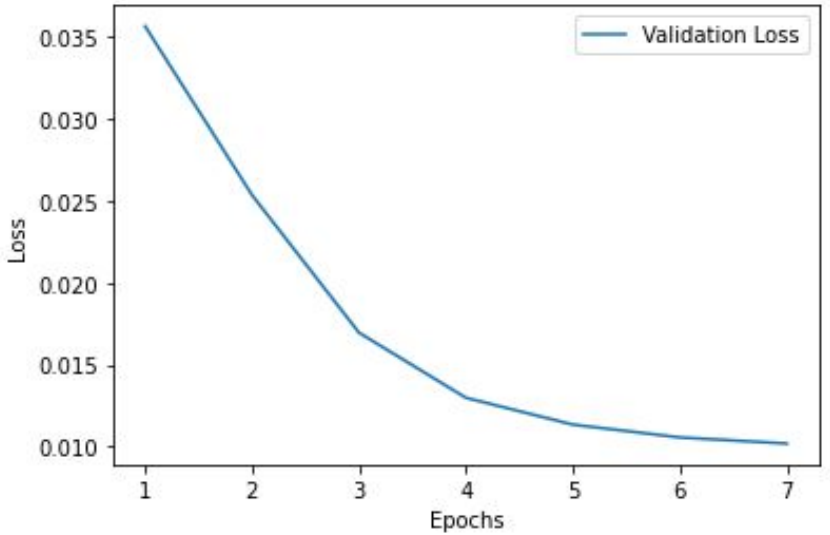
# Reconstructed Video (90 fps)

## Reconstructed

## Ground Truth

# Epochs Vs Loss

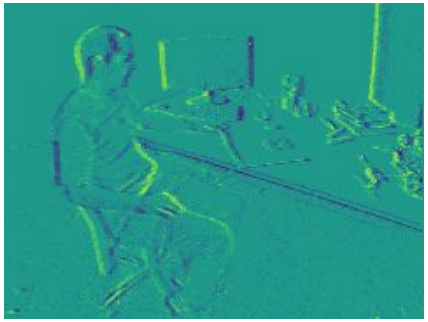
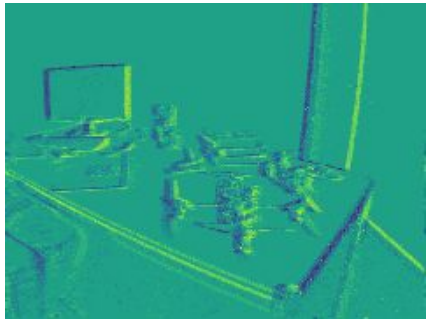
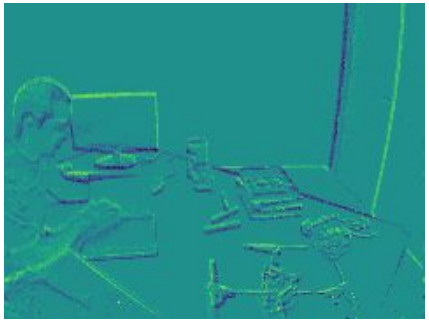
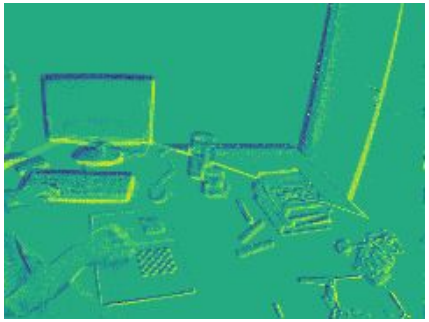
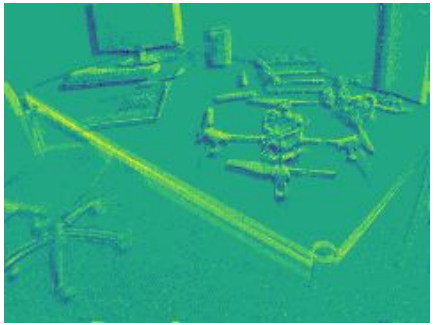
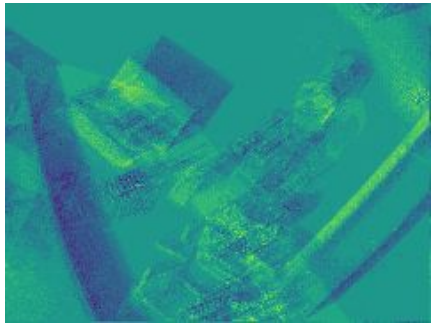
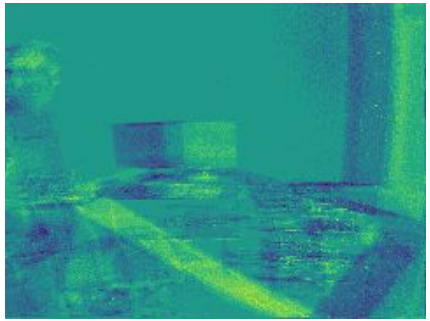
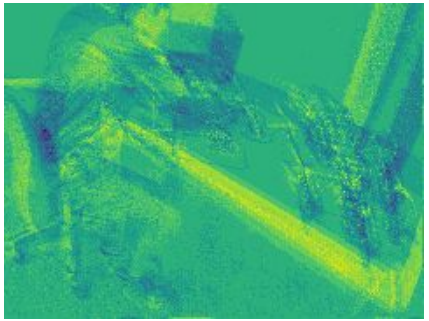


# 3. Dynamic_6DOF Dataset

**Reference:** *http://rpg.ifi.uzh.ch/davis_data.html*

# Event Frames

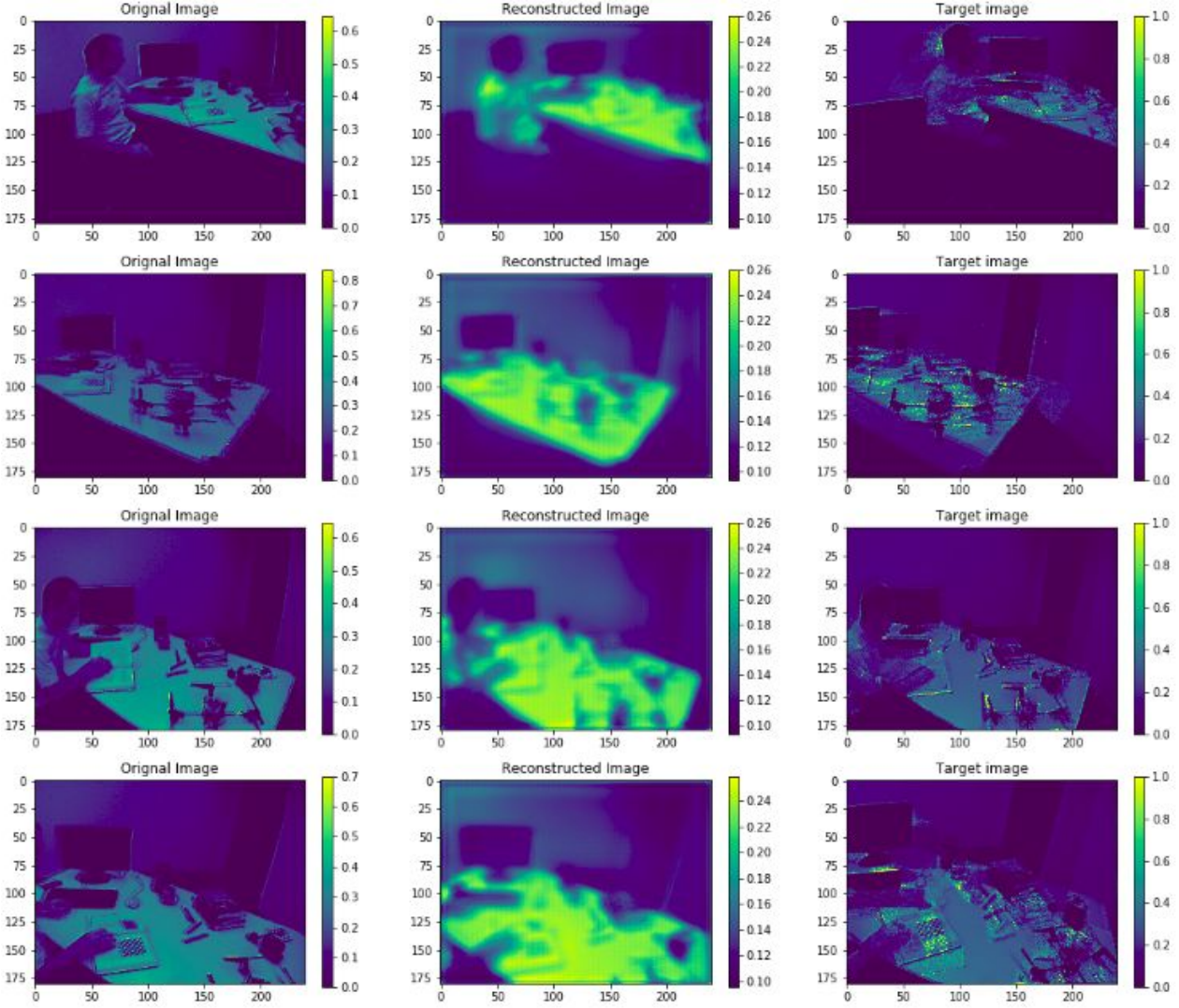









**(Sequence from left to right):** **50 , 200 , 350 , 500 , 650 , 800 , 950 , 1250**

# Results

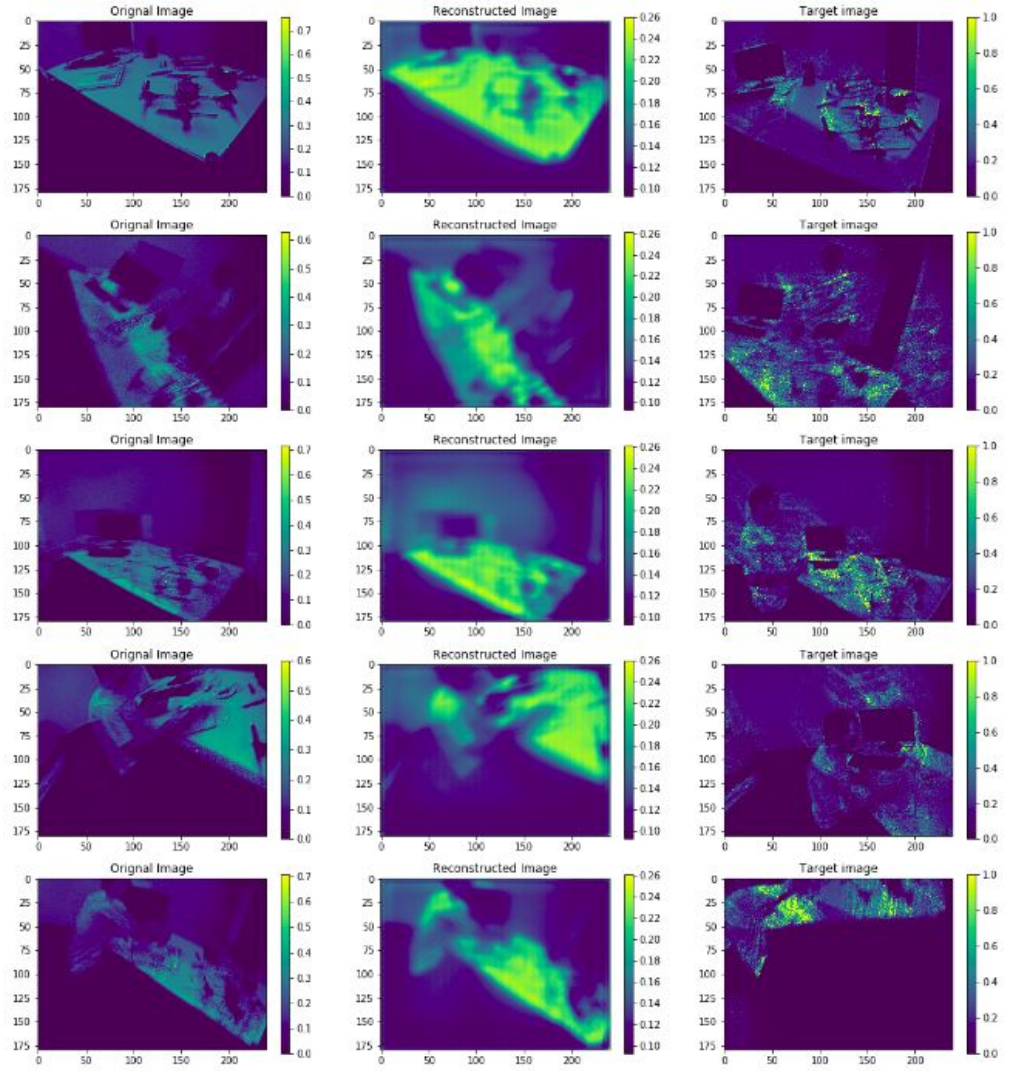
**Top To Bottom:**

50 , 200 , 350 , 500



**Top To Bottom:**

650, 800 , 950 , 1100 , 1250

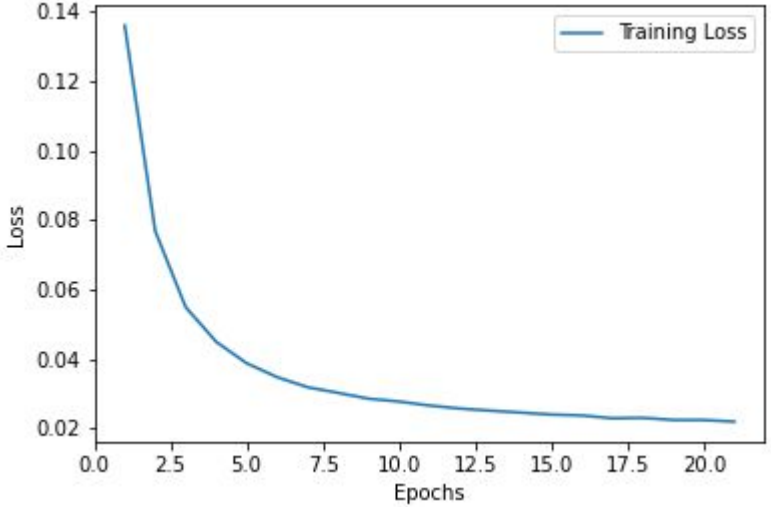


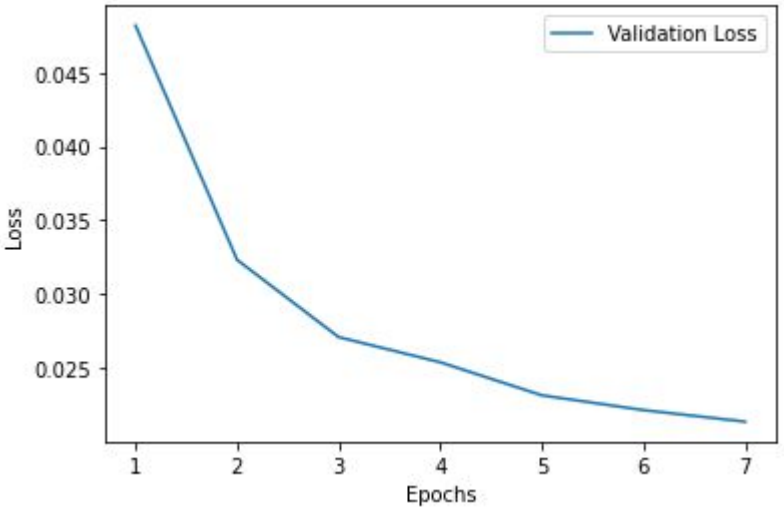
# Reconstructed Video (60 fps)

## Reconstructed

## Ground Truth

# Loss Vs Epochs

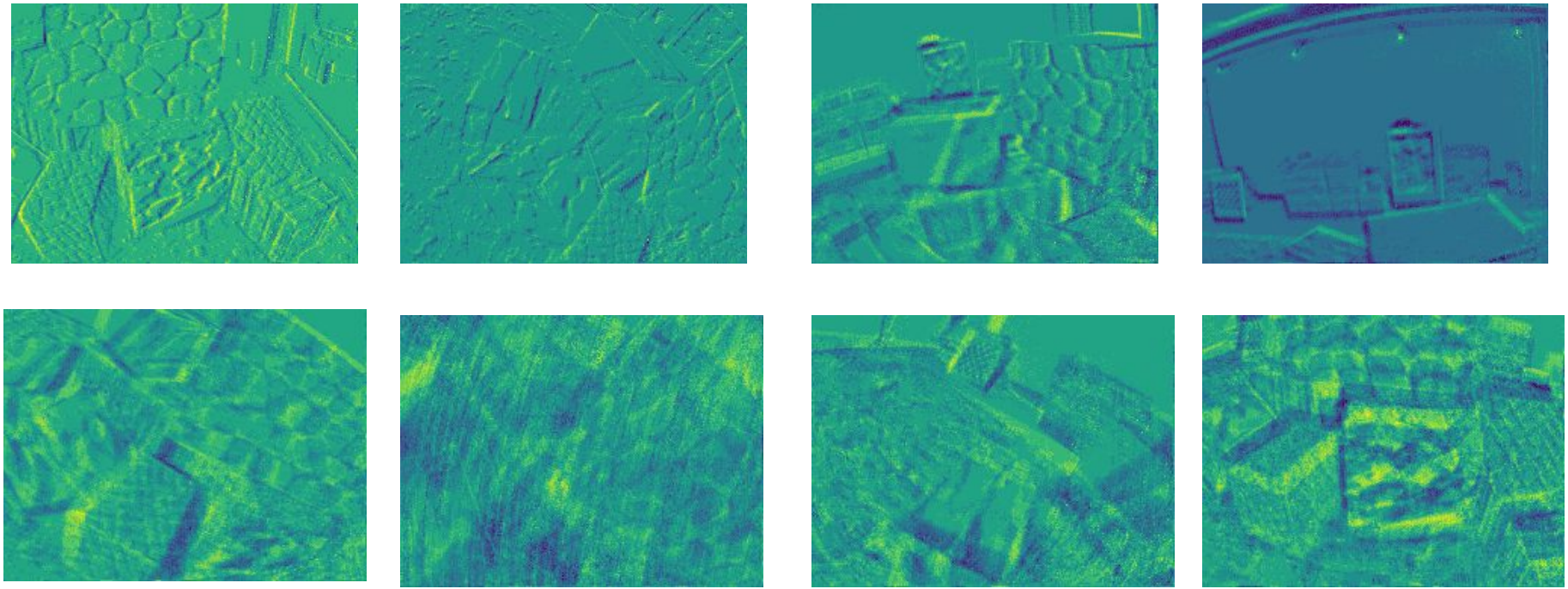


# 4. Boxes_6DOF Dataset

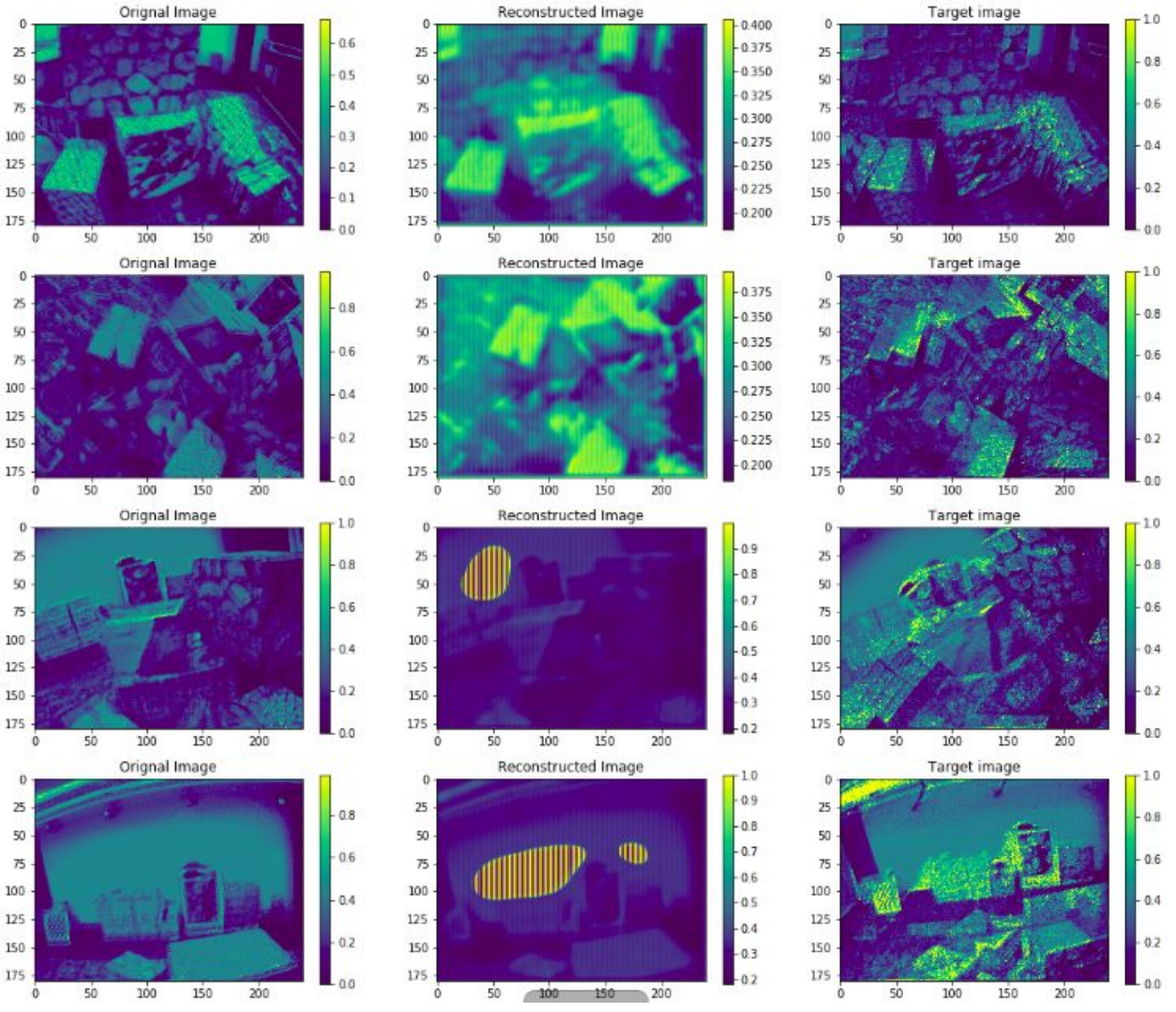
**Reference:** *http://rpg.ifi.uzh.ch/davis_data.html*

# Event Frames



(Sequence from left to right): 50 , 200 , 350 , 500 , 650 , 800 , 950 , 1250

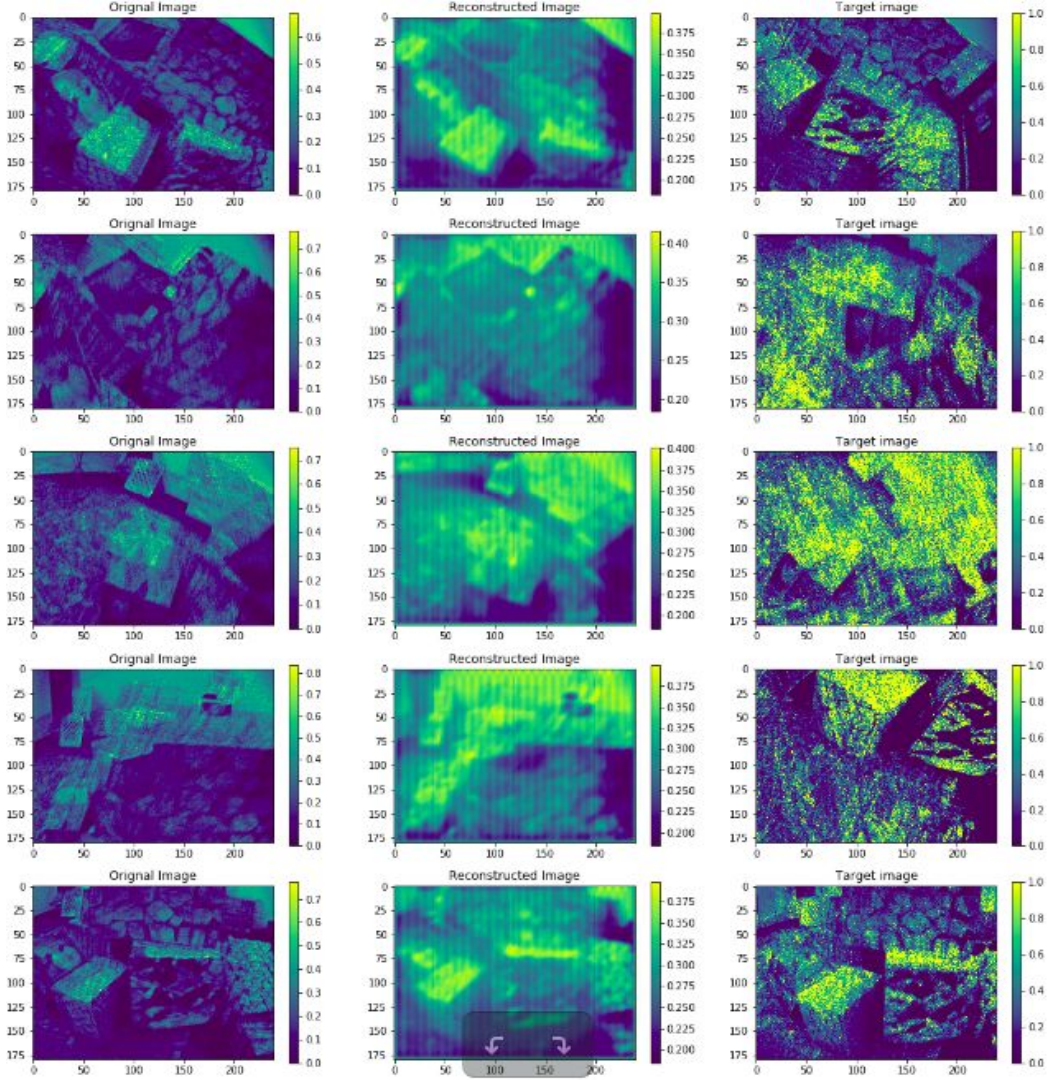
# Results




## Top to Bottom:

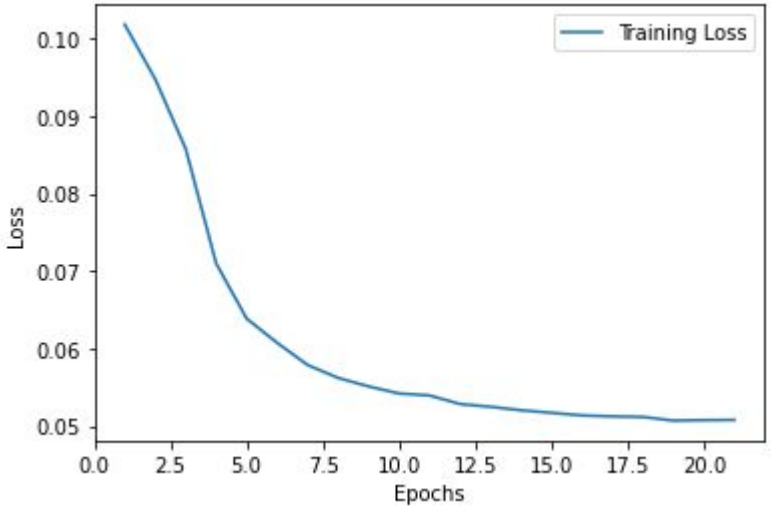
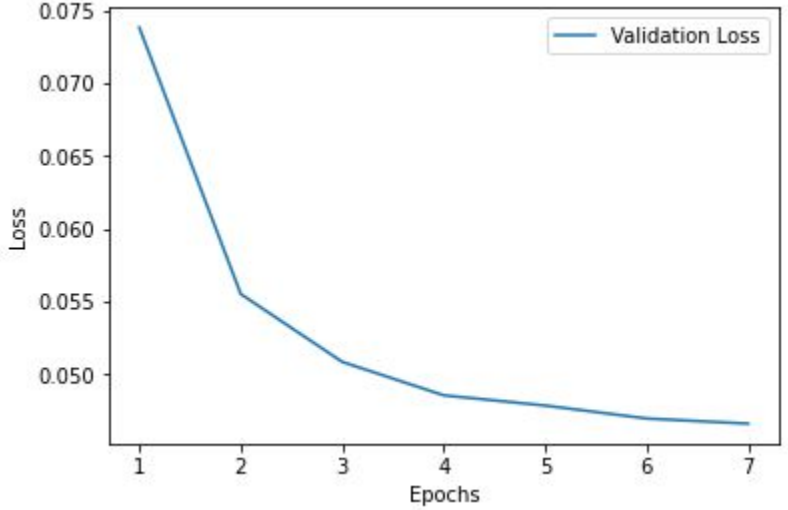
**50 , 200 , 350 , 500**

**650, 800 , 950 , 1100 , 1250**



# Reconstructed Video (60 fps)

Reconstructed

Ground Truth

# Loss Vs Epochs