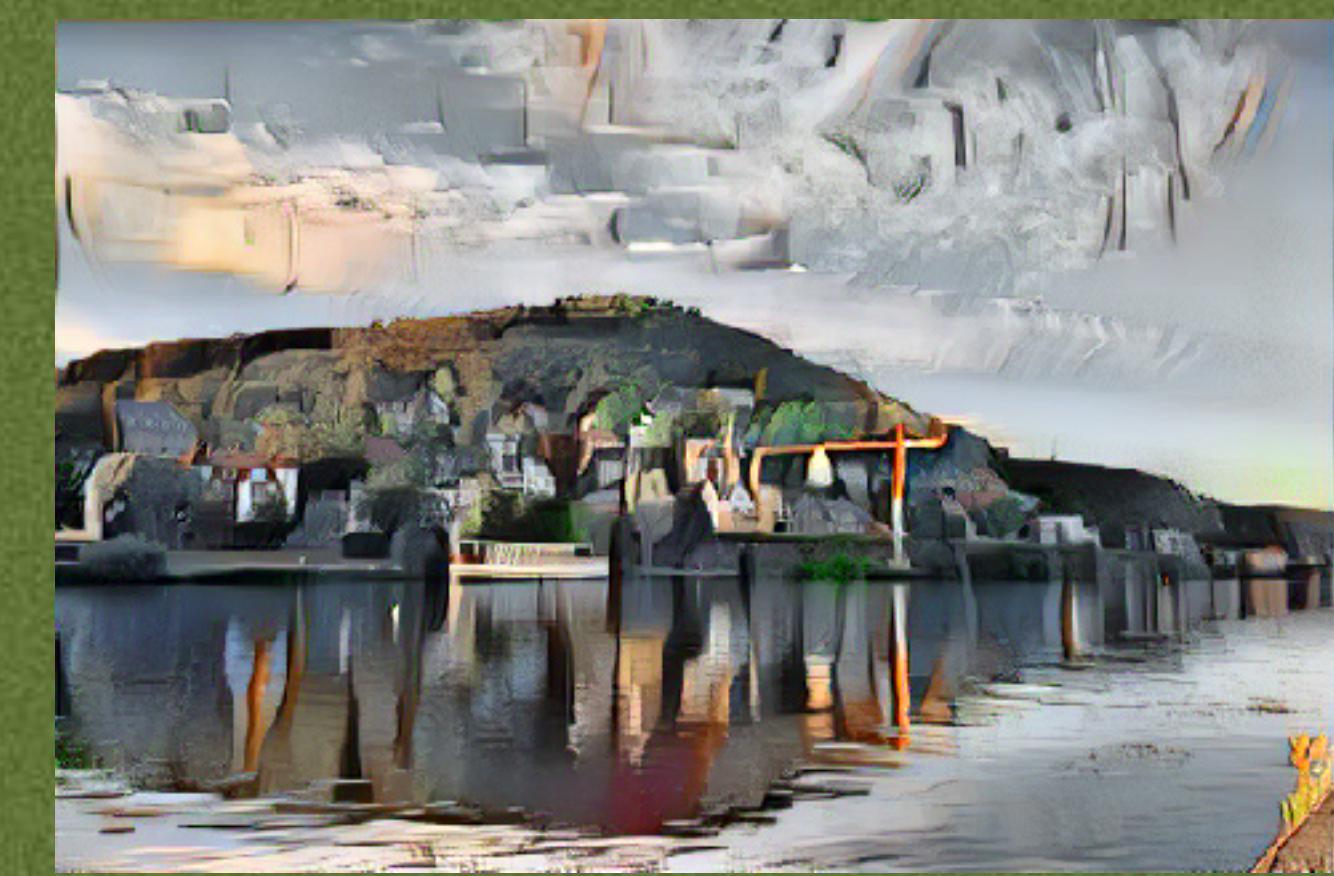




# Artistic style transfer for videos - ORIU Project

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**Images:**  
Combines Style and Content image



Figure 1. Stylized image



Figure 2. Style image



Figure 3. Content image

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## Style Transfer

- Uses pretrained VGG19 model
- Content conv 4, style conv 1-5
- Minimizes loss between Style and Content

## Method

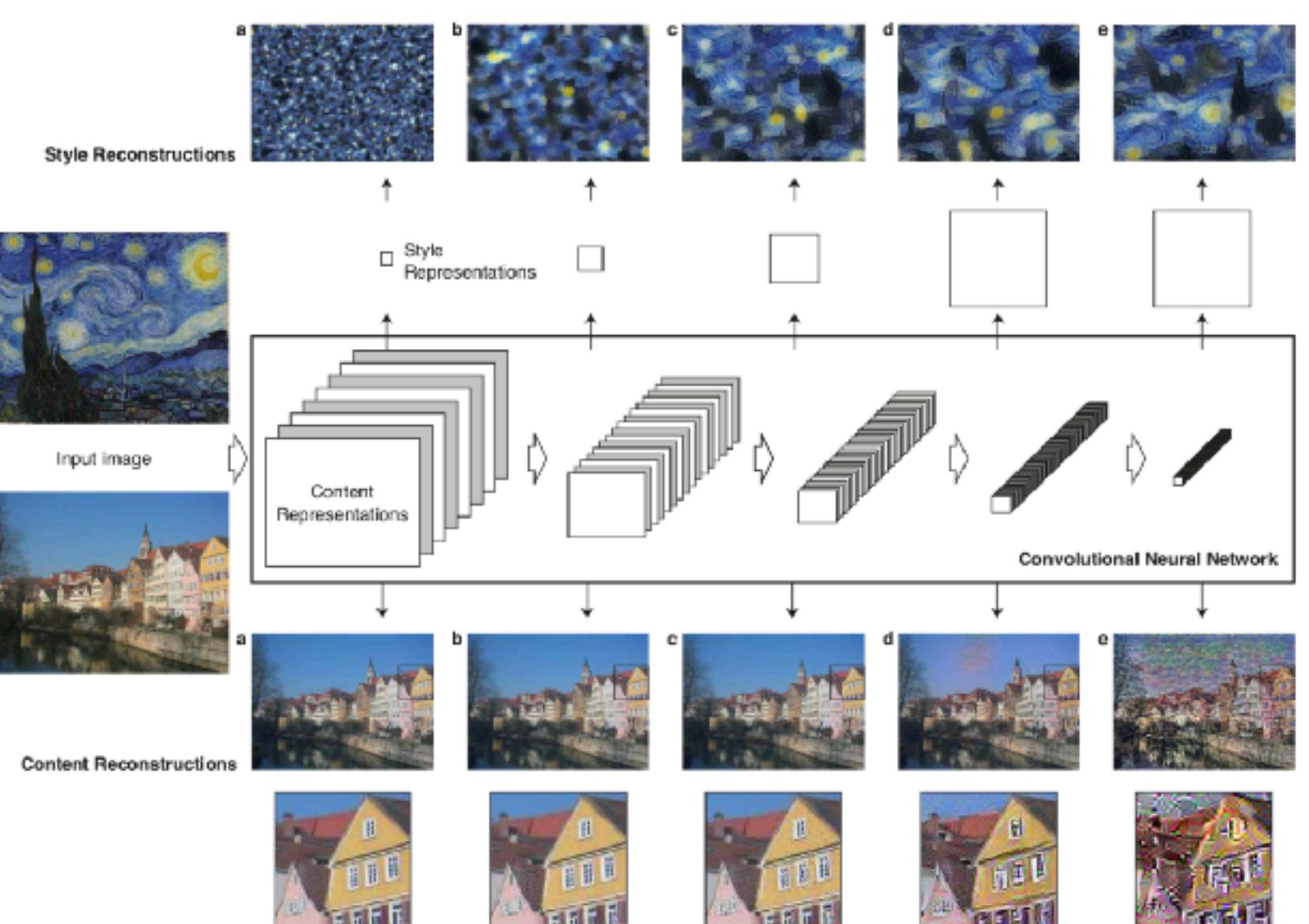


Figure 4. Compare different learning rates and additional features.

- Gram Matrix Style  $G_{ij}^l = \sum_k F_{ik}^l F_{jk}^l$
- For layer l, i,j pos within layer
- Compare G for real and new image

## Limitations

- Takes long for each image
- GPU limits image size (350:525)
- Style has to fit to content

## Modifications for video

- $$\mathcal{L}_{total} = \alpha \mathcal{L}_{content} + \beta \mathcal{L}_{Style} + \gamma \mathcal{L}_{temporal}$$
- Initialization
  - Initialization warping using flow
  - temporal loss



Figure 5. Neckarfront in Heidelberg, Castle in Heidelberg and Mannheim and a cat with style The Starry Night by Vincent van Gogh

## Problems

- Init with applied flow lead to worse results
- Some formulas in paper are hard to translate into code

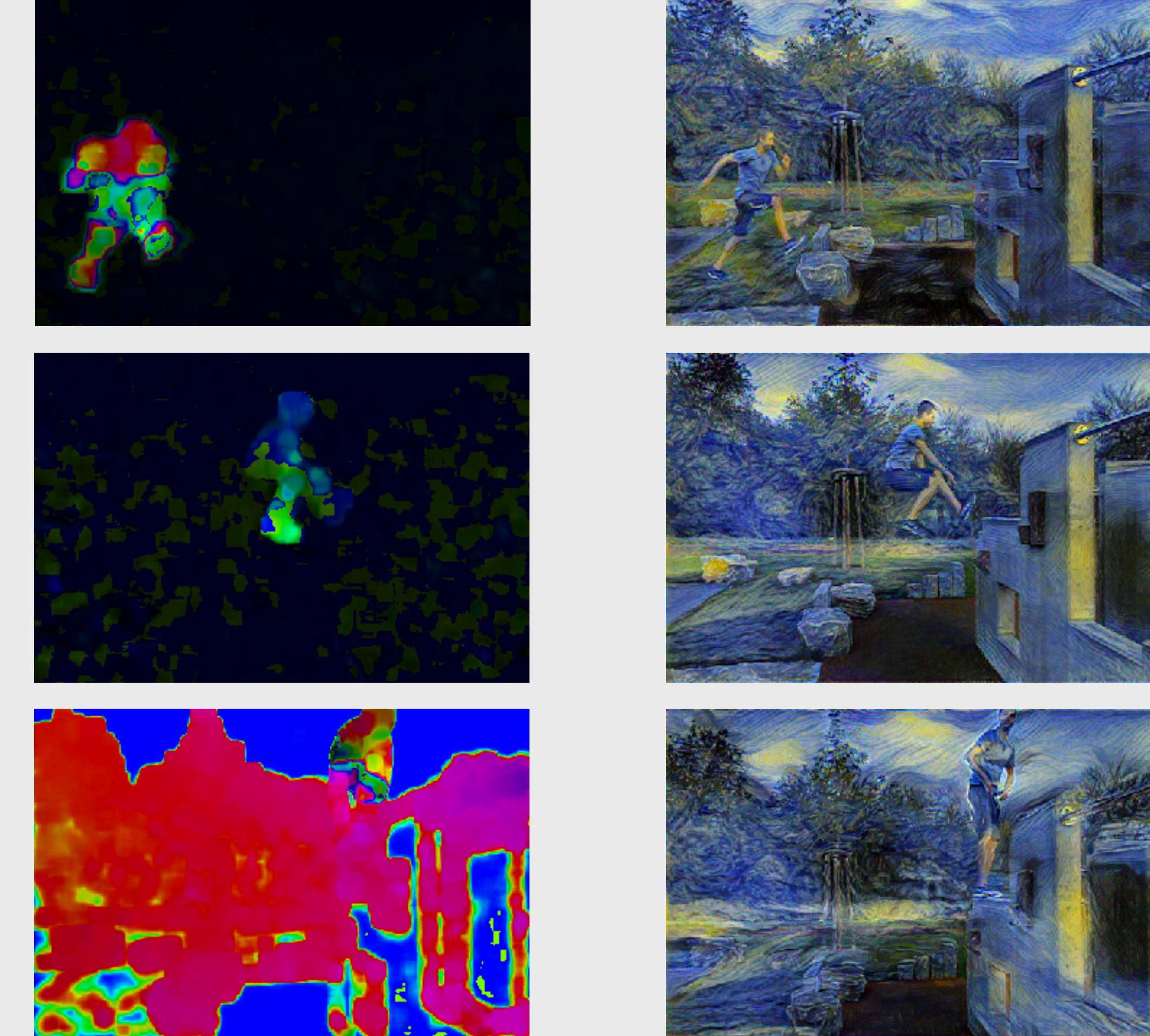


Figure 6. Video, Flow and Stylized compared

## Experiments

- Old stylize init, no temporal Loss
- Use temporal loss, old init
- Warp old init, no temporal Loss
- Use temporal loss and warped init

## REFERENCES

A Neural Algorithm of Artistic Style, Gatys et al. 2015  
Artistic style transfer for videos, Ruder et al. 2016  
Tutorial: [https://pytorch.org/tutorials/advanced/neural\\_style\\_tutorial.html](https://pytorch.org/tutorials/advanced/neural_style_tutorial.html)