Image combination using CNN feature extraction

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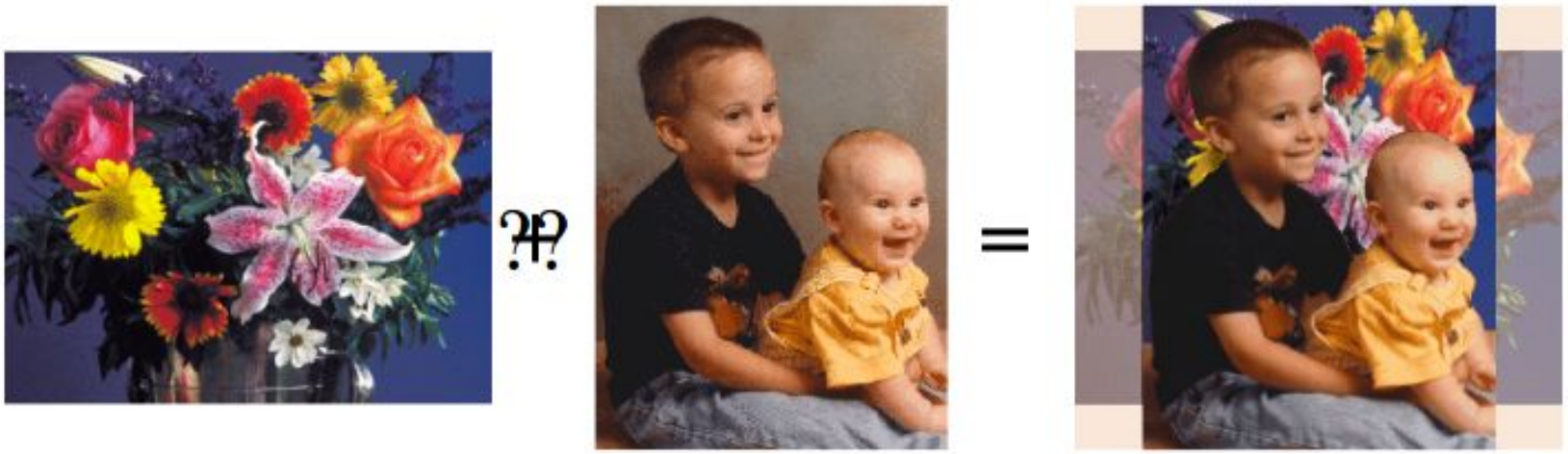
git repo

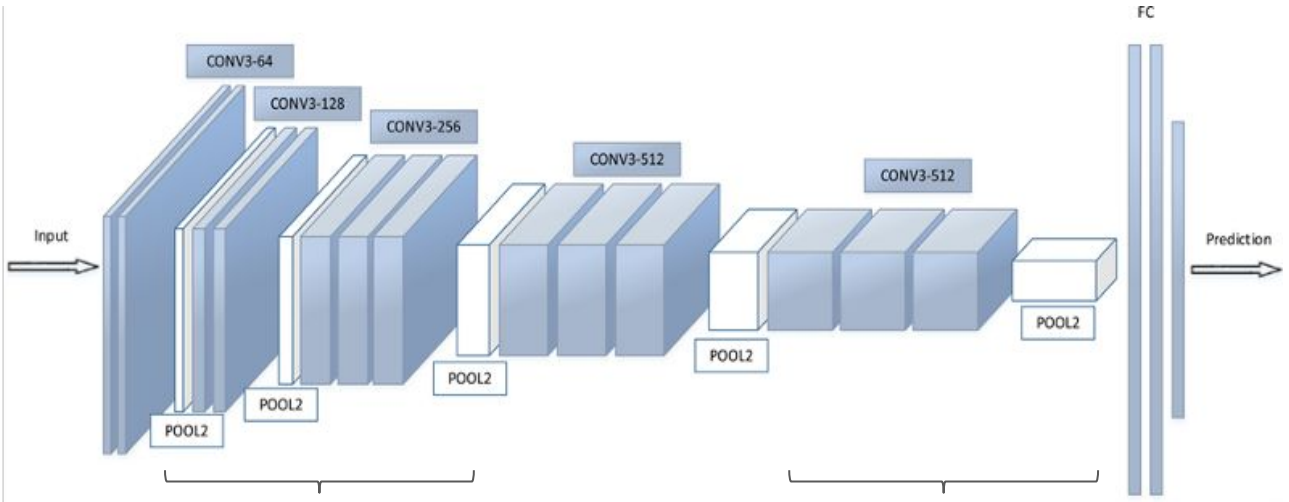
Problem



Inspiration / Previous work

A Neural Algorithm of Artistic Style. Leon A. Gatys, Alexander S. Ecker, Matthias Bethge. CVPR 2015

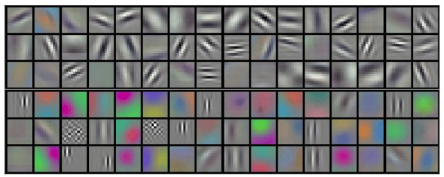
Style vs Content



Style

Content

Contour detection



Object recognition

Idea / first approach

Content Features
(Buildings, sky, ...)

Style Features
Dark colors, bright points/lights, …)

Our approach

Feature extractor

Low level features

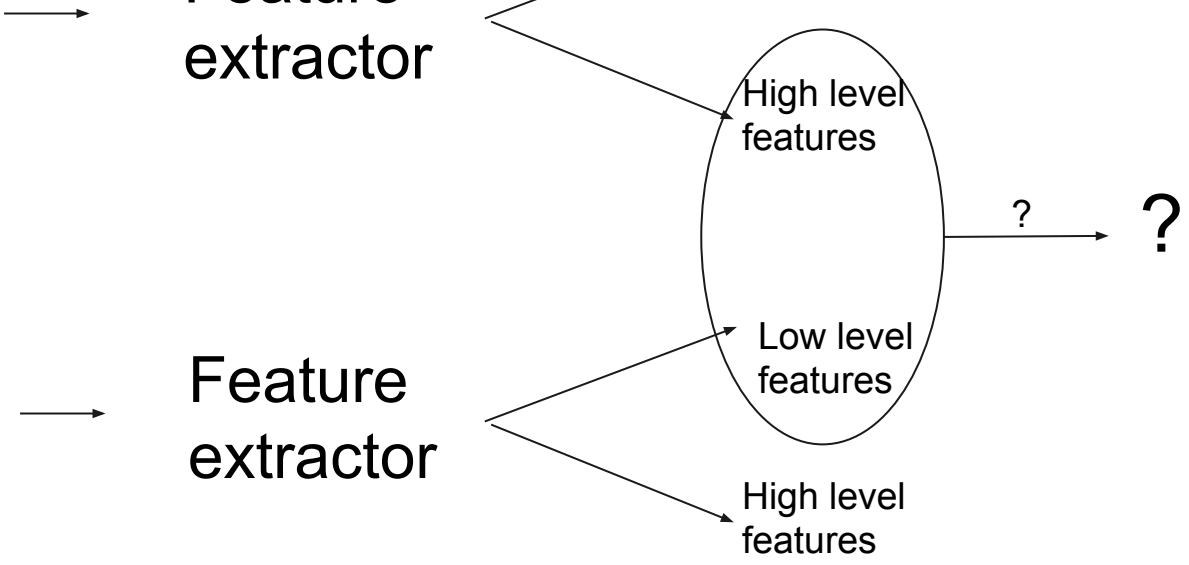
High level features

Feature extractor

Low level features

High level features

Our approach



Defining the features

Deep CNNs have multiple layers which can be associated to multiple levels of abstraction

Higher layer activations → Higher level features

Lower layer activations → Lower level features

Feature combination

What image has the high level features of one image and the low level features of the other?

We optimize pixel values

Defining a loss function

MSE between the activations (features) we desire and the activations we are getting

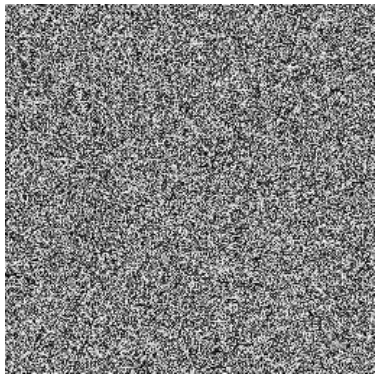
Optimization

MSE between the activations (features) we desire and the activations we are getting with the input

Minimizing this function with respect to the pixel values using backprop + SGD

Initial values

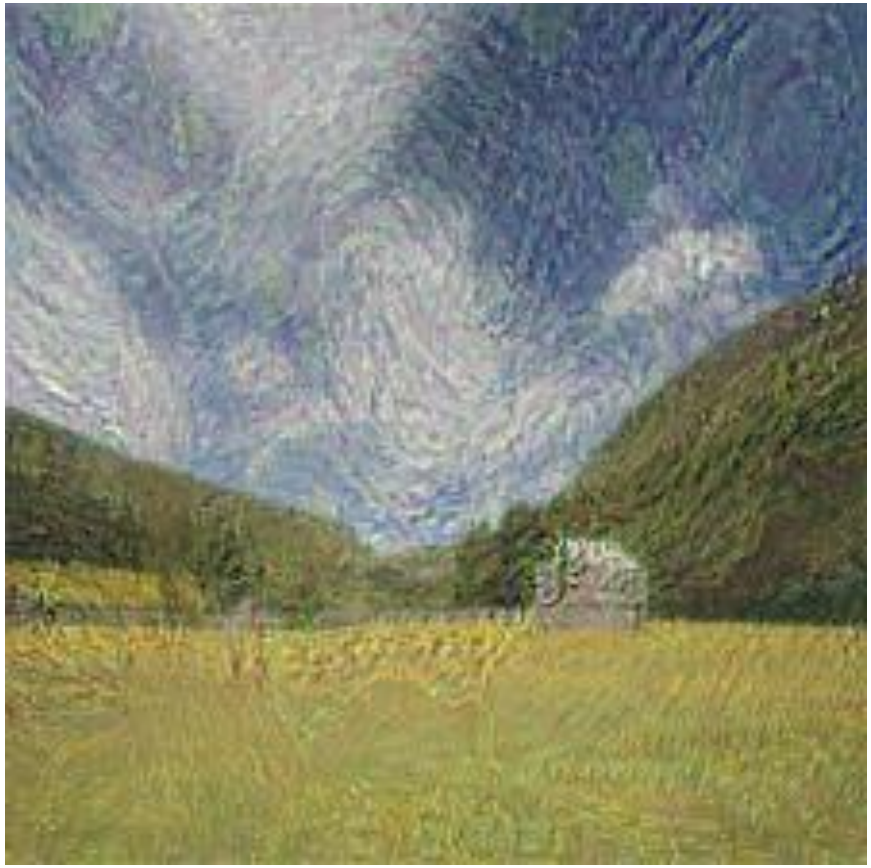
1. Style image
2. Content Image
3. Random noise



Results

1st 4 layer activations style, 3 last layer activation conten.
content init

1st 4 layer activations style, the other activations content.
content init



All layers style, content init

All layers style, content init

Future research

1. Trying random init, see where does it converge.
2. Use other models to extract features.
3. Modify the loss function.
4. More complete generative models
5. Combine it with segmentation

Questions?

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