Issue of Layer Chosen Strategy In Neural Style Transfer

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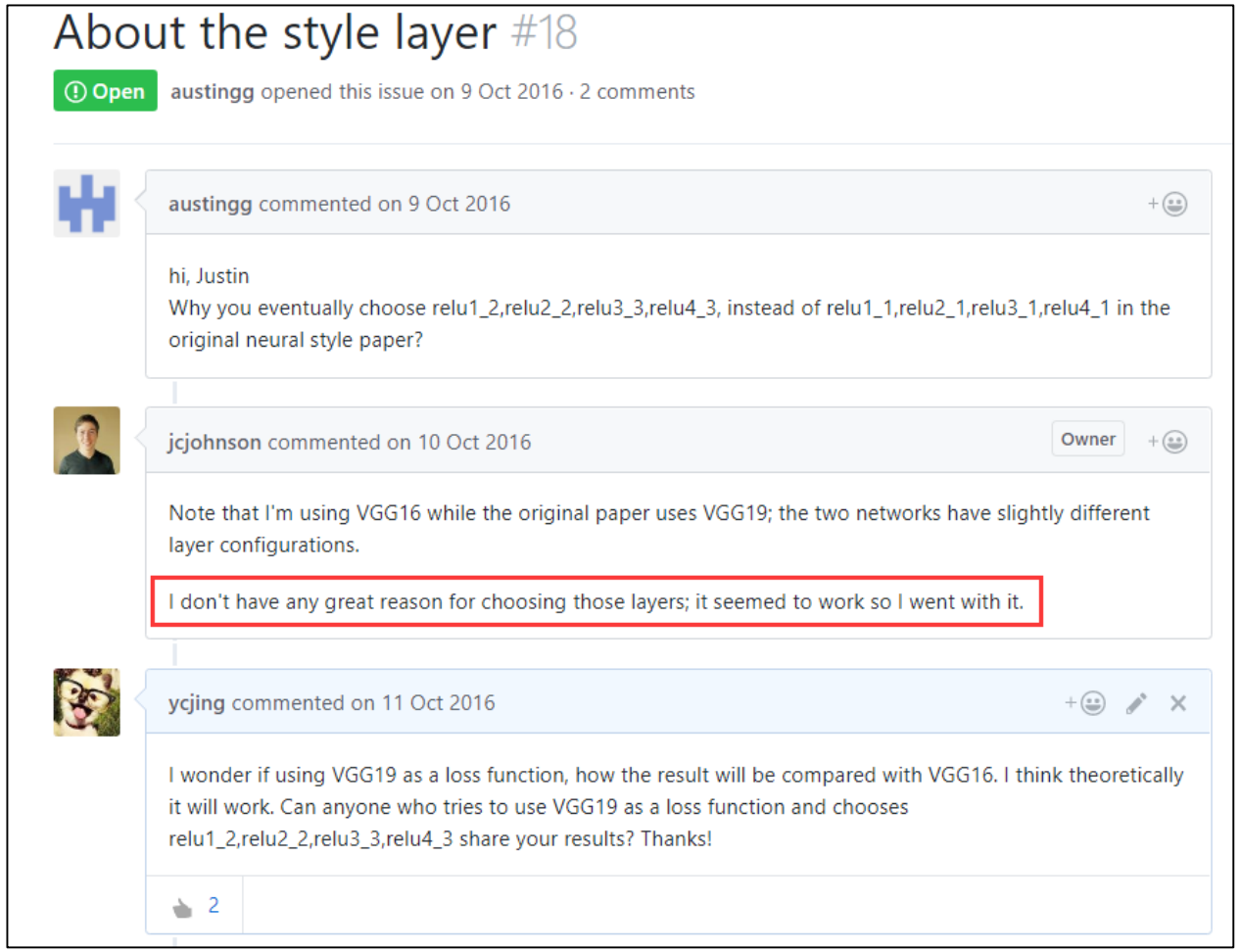
Choice of Layers in Style Transfer

- “Slow” style transfer algorithm of Gatys et al.
  - Content layer: {conv4_2}
  - Style layer: {conv1_1, conv2_1, conv3_1, conv4_1, conv5_1}

- “Fast” style transfer algorithm of Johnson et al.
  - Content layer: {conv2_2}
  - Style layer: {conv1_2, conv2_2, conv3_3, conv4_3}

Why these layers?

- In conclusion, the layer is chosen through attempts and experience.
- Justin Johnson's comment on this problem:



About the style layer #18

Open austingg opened this issue on 9 Oct 2016 · 2 comments

austingg commented on 9 Oct 2016

hi, Justin
Why you eventually choose relu1_2,relu2_2,relu3_3,relu4_3, instead of relu1_1,relu2_1,relu3_1,relu4_1 in the original neural style paper?

jcjohnson commented on 10 Oct 2016 Owner

Note that I'm using VGG16 while the original paper uses VGG19; the two networks have slightly different layer configurations.

I don't have any great reason for choosing those layers; it seemed to work so I went with it.

ycjing commented on 11 Oct 2016

I wonder if using VGG19 as a loss function, how the result will be compared with VGG16. I think theoretically it will work. Can anyone who tries to use VGG19 as a loss function and chooses relu1_2,relu2_2,relu3_3,relu4_3 share your results? Thanks!

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https://github.com/jcjohnson/fast-neural-style/issues/18

Exploration of Layer Chosen Issue

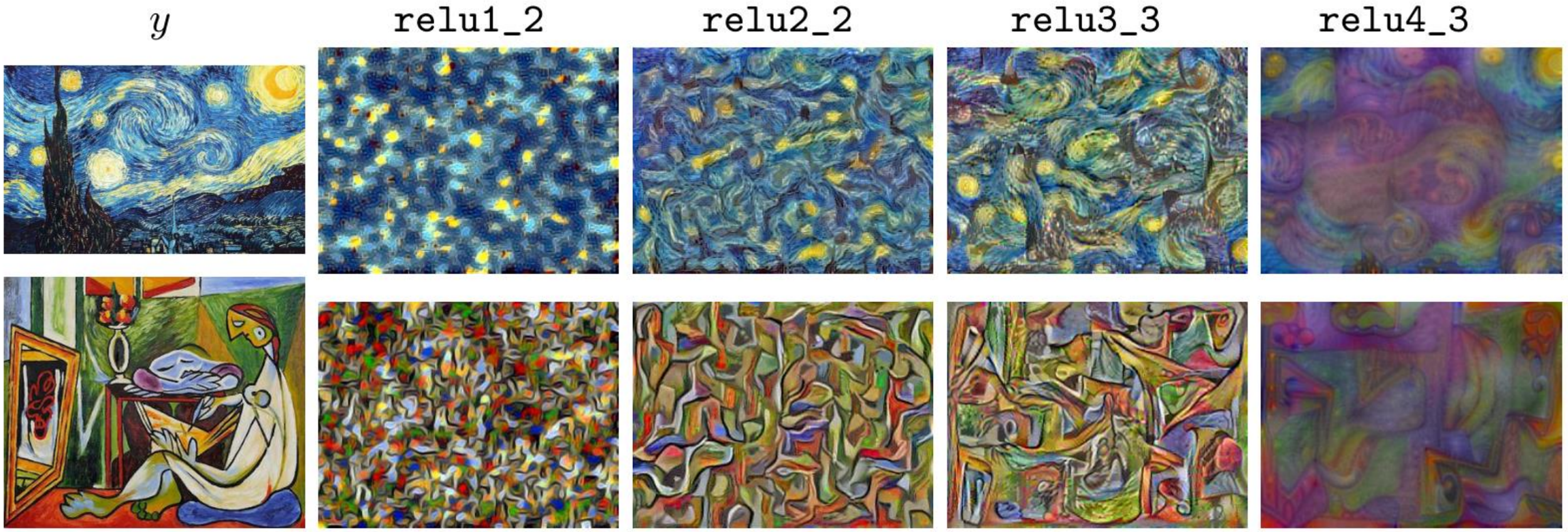
- Paper: A Neural Algorithm of Artistic Style (Gatys et al.)

The style feature scale and complexity goes down as using lower and lower convolutional layers to represent style

Exploration of Layer Chosen Issue

- Paper: Perceptual Losses for Real-Time Style Transfer and Super-Resolution (Johnson et al.)

Image reconstruction result from the following layers



Same conclusion with the previous slide.

Exploration of Layer Chosen Issue

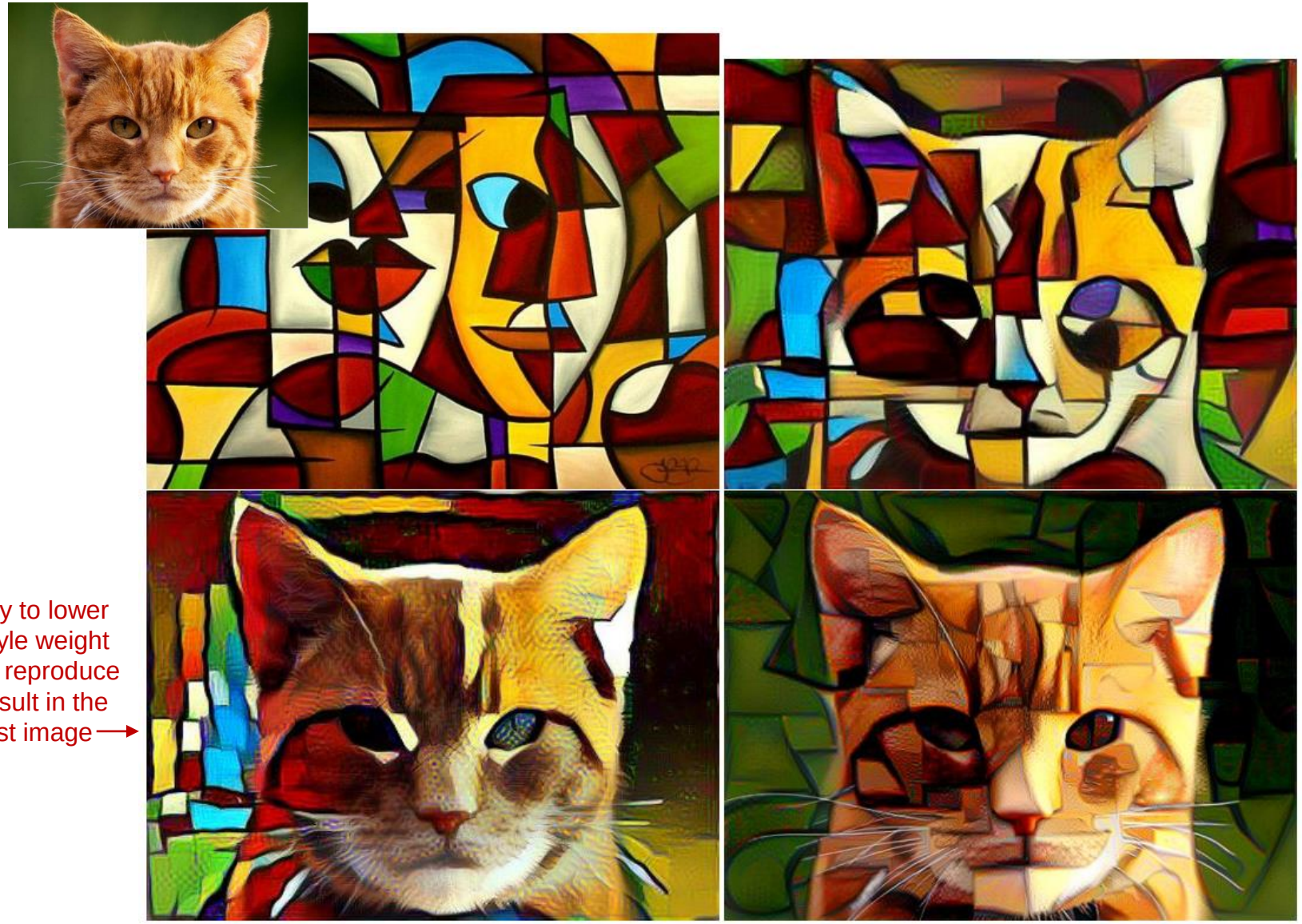
- Paper: Image Style Transfer Using Convolutional Neural Networks (Gatys et al.)

Different Content Layers

Lower layer preserves much of the fine structure of the original photograph.

Exploration of Layer Chosen Issue

- Paper: Exploring the Neural Algorithm of Artistic Style (Nikulin and Novak)



← Original layer choice in Gatys et al's paper

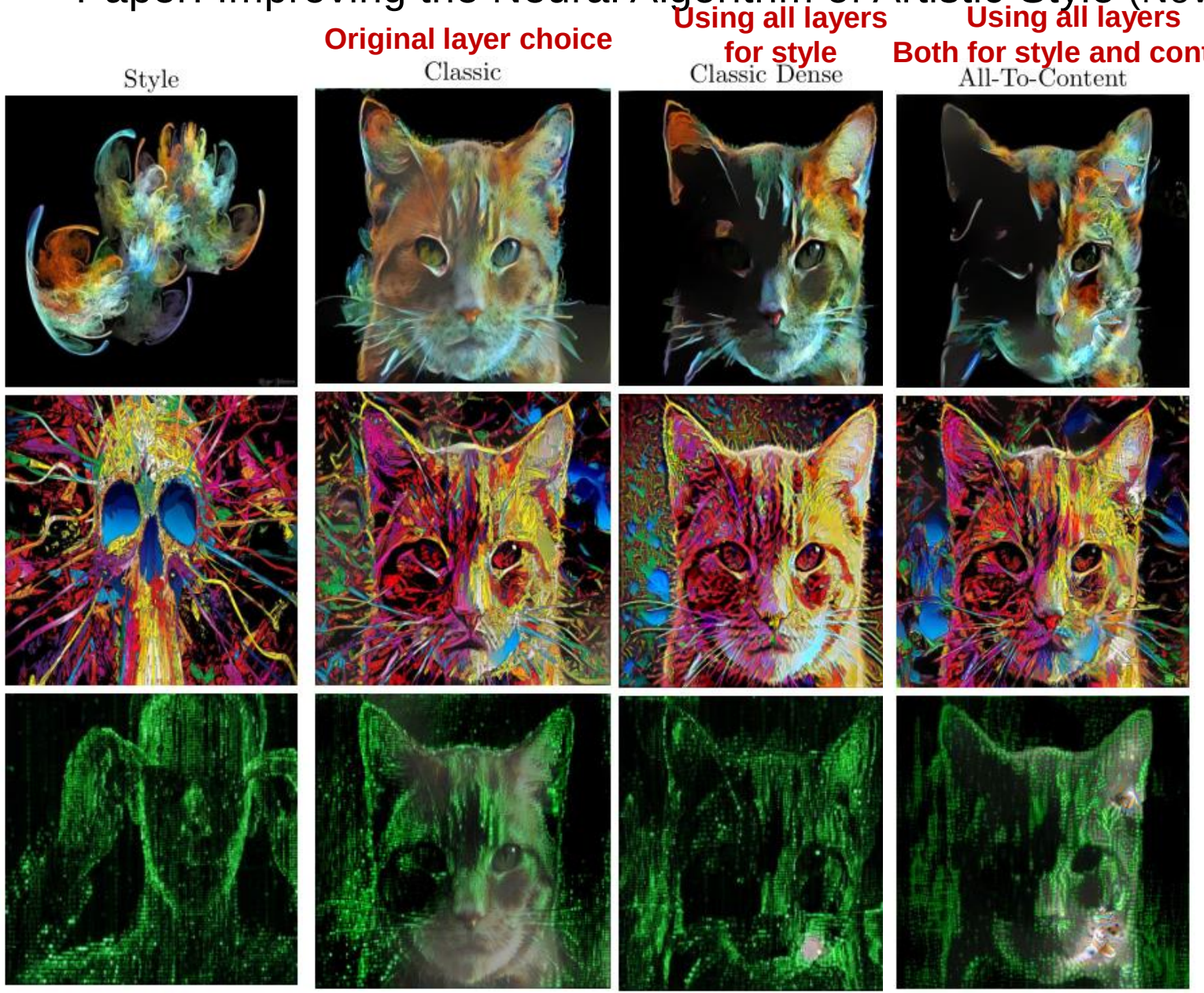
Using some lower layers in content representation and layers in style representation retains the colors and low-level features of the content photo. Simply using lower style weight cannot reproduce the same result.

Try to lower style weight to reproduce result in the last image →

← Change layer to:
Content layer {conv1_1,conv2_1,conv4_1,conv4_2}
Style layer {conv3_1, conv5_1}

Exploration of Layer Chosen Issue

- Paper: Improving the Neural Algorithm of Artistic Style (Novak and Nikulin)



Using all 16 convolutional layers for style representation can lead to a consistent improvement in quality across the majority of style images. (though computation complexity is higher)

Other Related Discussion and Results

- https://www.reddit.com/r/deepdream/comments/4ky9zp/scarlett_johansson_x4/d3j6nnn/
- http://imgur.com/a/rS5NS

Thanks!