3. Conditional Fast Style Transfer

- **Add a style condition input to ConvDeconv net.**
  - Add a fusion layer and a style input
  - Style input: one-hot conditional vector e.g. style1: [1,0,0,0,...], style2: [0,1,0,0,...], style3: [0,0,1,0,...]
  - Base network: Johnson’s ConvDeconv net [B]
  - Each layer has BN and ReLU except last one.

- **Training**
  - Perceptual loss with VGG16
  - (the same way as Johnson’s work [B])
    - content: conv3_3
    - style: conv1_2, c2_2, c3_3, c4_3
  - Each mini batch: one content image + all the style images (= multi-style version of Instance Normalization)

- **Generating stylized images in three ways**
  - Input: content image + style condition vector
    - Single style: one-hot vector [1,0,0,0,...], [0,1,0,0,...]
    - Mixed style: multiple-style-weighting
      - [1,1,1,...], [0.2, 0.1, 0.8,...]
  - Spatial mixed style:
    - Style1
    - Style2
    - Mixed Style
    - Spatial Mixed Style

- **Conditional Fast Style Transfer Network**

- **Unseen Style Transfer**
  - **Results of cond. style transfer with trained styles**
  - **Results of unseen style transfer**
    - with NOT-trained styles

4. Unseen Style Transfer

- **Add a style condition network to the conditional FST network.**
  - Confirmed that a real-value cond. is OK.
  - Style condition vector can be generated by a CNN (not by hand)
  - Propose a style condition network which generates a style condition vector from a given style image directly.

- **Unseen Style Transfer Network**
  - = Conditional Fast Style Transfer Network
  - **Training** + Style Condition Network
    - End-to-end training with perceptual loss
    - Each mini batch: one content image + randomly selected style images from 50,000 style images (WikiArt)
    - Generating stylized images in three ways
      - the same way as a Conditional Fast Style Transfer Network

- **Online Demo**

- **Conditional Style Transfer Network for Mobile**

5. Mobile Implementation

- Shrink the network for mobile devices.
  - Add one down-conv. and one up-conv.
  - Reduce the num of ResBlock from 5 to 3

- **Online Demo**

- **References**
