Context Encoders: Feature Learning by Inpainting

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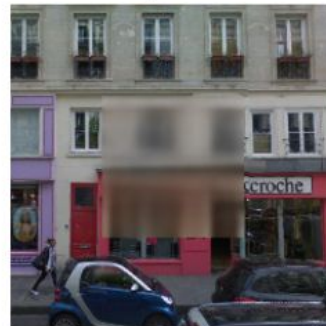Nihar Potturu - 2018102039

Main Objective

- The main objective of this paper is to reconstruct the missing part of an image, using Context Encoders – a convolutional neural network trained to generate the contents of an arbitrary image region conditioned on its surroundings.

(a) Input context

(b) Human artist

(c) Context Encoder (L2 loss)

(d) Context Encoder (L2 + Adversarial loss)

Related Previous Works

- The part of the image missing is too large for **classical inpaintings.**
- **Scene completion** can't fill arbitrary holes in the image
- Previous implementations use **hand-crafted distance metric,** like Gist

We use learned distance metric which is superior to hand crafted distance metric.
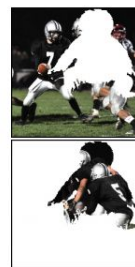
Method overview :

- We use an encoder-decoder architecture.
- The output of the context-encoders is a feature vector.
- The feature vector is channel-wise connected to the decoder
- The decoder fills in realistic image content using the encoded feature vector
- This architecture is based on the renowned AlexNet Architecutre
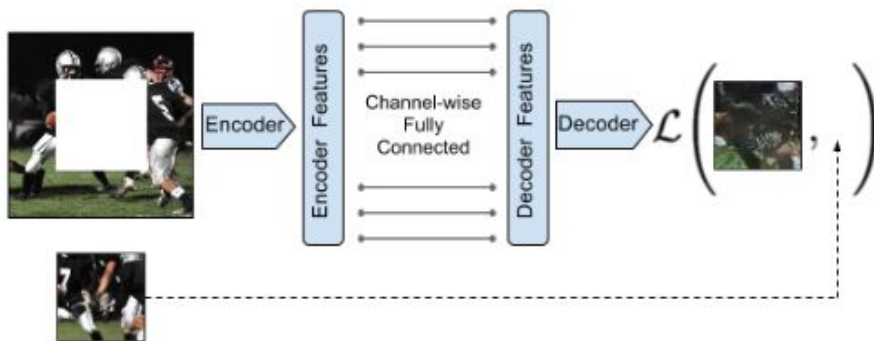
(a) Central region   (b) Random block   (c) Random region

Method overview :

The pipeline consists of three major stages:

- **Context Encoder**: Our model is not trained for ImageNet classification; rather, the network is trained for context prediction "from scratch" with randomly initialized weights.
- **Channel-wise fully connected layer**.
- **Decoder**: It generates pixels of the image using the encoder features.

Loss function:

- **Reconstruction Loss:** We use a normalized masked L2 as our reconstruction loss function
- **Adversarial Loss:** Loss based on GAN's

Significance of AlexNet

Alex net is a Deep Learning Architecture that consists of :

- 5 Convolutional Layers
- 3 Fully Connected Layers

What makes this architecture special is its outstanding performance on the ImageNet image classification dataset.

This architecture shows good performance in other tasks involving extracting features from scenes

Unlike the actual AlexNet, our modal isn't trained for the ImageNet dataset.

Timeline

Understanding the paper, and having a clear view on the tasks to be completed and the corresponding timelines

Completing Encoder part

Final Submission

Feb 28th

March 30th

Feb 20th

Mid-Evals (March)

Final Evaluation

Getting started on the implementation

Completing Decoder part