

Master thesis : Style Transfer on Face Portraits

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Style Transfer on Face Portraits

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Abstract

The topic of style transfer and, more specifically, style transfer on head portraits is tackled in this thesis, primarily through the lens of *optimization-based, neural* style transfer algorithms. Several techniques from the recent literature are examined and their advantages as well as shortcomings are discussed – both individually and in relation to one another – before elaborating a solution combining the strengths of these various algorithms.

"*A neural algorithm of artistic style*" [2] is first considered, laying the foundation for most algorithms included in this work with its neural style transfer framework, which is shown to be rather modular in subsequent chapters.

After mixed results are observed with this first algorithm, three localized style transfer techniques, namely "*Combining markov random fields and convolutional neural networks for image synthesis.*" [3], "*Semantic style transfer and turning two-bit doodles into fine artworks*" [1] and "*Visual Attribute Transfer through Deep Image Analogy*" [4] are reviewed, and prove be a better fit for the task, thanks to their property of performing the style transfer in a context sensitive manner.

Where preceding methods are general, the specialized setting considered in this thesis is addressed with a discussion of the "*Painting style transfer for head portraits using convolutional neural networks*" [6] paper.

Lastly, a solution to the problem is proposed, combining the *Painting style transfer for head portraits* with the "*Deep Painterly Harmonization*" [5] method, which itself incorporates concepts from the methods explained in chapters 2 and 3. Results obtained with this last method are presented for a few different examples; they compare favorably to those resulting from the base *Deep Painterly Harmonization* technique when dealing with face portraits.

The solution's primary limitations are identified in the form of a high memory consumption and significant execution time. Pointers to deal with these issues in future works are also provided.

Bibliography

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