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Virtual Painting recoloring using Vision Transformer on Deep Embedded X-Ray Fluoresce synthetic dataset

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In the last few years, the rise of deep learning techniques has affected also the field on physics-based imaging applied to cultural heritage. One possible application of such techniques is the virtual digital restoration of pictorial artworks.

Two main problems we face when exploring such landscape are

1. The small dataset sizes (due to the slow pace of such analysis, as well as Intellectual Property issues)
2. The huge dimensionality of each datapoint (due to the fact that physics-based techniques produces spectral datacubes)

We address those issues by creating a (huge) synthetic dataset and then embedding it unsupervisingly in a metric space, using an ad-hoc trained Deep (Variational) Embedding model, exploiting the hidden statistical relations of each pixel spectra.

Starting from such dataset, it is possible to train supervisingly standard Computer Vision models (such as U-ResNets or Vision Transformers) to try to assign an human readable RGB color to spectral datacubes, thus performing virtual digital restoration.

This task could be relevant, for example, in the context of detached frescoes, where colour legibility may have been (partially) lost, but physical signals may still be found.

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Classifica Sessioni: Tuesday afternoon: Part II