Material Incidence and Spatial Analysis of Materials in Visual Pre-Modern Art

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Introduction

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The recent increase in digitization of paintings by museums allows for new directions in the fields of art and perception. In this study we first use human annotators to identify paintings which depict each of 15 materials. In a second part, we identify the spatial location of where these paintings display these materials.

First Stage

Step 1) Collect paintings



Step 2) Collect human judgements

ctions: Click on the images where you can see some fabrics.

Category: fabrics

f you cannot tell, don't select the photo. Please do not guess. Don't worry if you miss small things that are lard to see. Atotal of **1571 participants** were recruited via **Amazon Mechanical Turk**, whom gave **5 responses per painting** for each material of **15 materials**. They completed a total of **36.838 completed tasks**, which results in **1.614.323 yes/no responses**.





1.614. No

votes

23

 \mathbf{M}

Yes

Results



Second Stage

Next, we took the paintings that depicted a material and asked AMT workers to create bounding boxes around these materials. This stage is currently ongoing, but here we present initial results for over 10.000 bounding boxes. We overlaid each bounding box per material over a normalized painting of 2048 by 2048 pixels and have visualized these as heatmaps below. Heatmaps for material incidence



Conclusions

The large scale analysis of art utilizing a human-in-the-loop approach opens new avenues for digital art history. Our current on-going method appears to be promising and already allows for a new outlook onto the depiction of materials within paintings. While some results are obvious ('sky is up, the ground is down') other findings are more interesting, such as metal, being predominantly scattered. It is also interesting to note that there is a clustering of glass in the upper-left quadrant, which might be related to the convention of light originating from the top left.