Collecting Material

For 15 material categories, we asked human annotators from Amazon Mechanical Turk (AMT) to indicate the presence of each material within each painting. Each painting was annotated for each material by at least 5 participants. If annotators achieved 80% agreement on a painting/material combination, we would mark that painting to depict the target material.

A matrix showing the rate of co-occurrence between each pair of materials, calculated as the ratio between the number of paintings where both materials are present divided by the number of paintings where either material are present. For example, skin and fabric are depicted in +/- 80% of our paintings, while food is only present in about 5% of the paintings.

A matrix showing the likelihood of finding one material, given that another material is present. The likelihood is calculated as the number of paintings where both materials are present divided by the number of paintings where either material is present. For example, if gemstones are depicted, then skin is depicted in 99% of the cases. However, if gemstones are not depicted, then skin is depicted in only 20% of the cases.

Collecting bounding boxes

Next, we selected 15 skilled AMT annotators to annotate more than 300K bounding boxes of the materials. This allowed us to identify the spatial location within paintings where materials are depicted.

The material heatmaps for 10 of the coarse-grained materials. In general, each material heatmap appears to be roughly vertically symmetric. For glass, there does however appear to be a minor shift towards the top-left. This might be related to an artistic convention, namely that light in paintings usually comes from the top-left. It is interesting to see how skin and gem are both vertically centered within the canvas. It appears to suggest a face, with dark lenses and jewelry adorning the figure.

Collecting fine-grained labels

Last, for 13 out of 15 materials, we collected fine-grained material labels for the bounding boxes. For example, fabrics could now be labelled as velvet. See the diagram below which includes all materials and associated fine-grained labels.

The fine-grained labels allows us to make more specific material heatmaps. Here the fine-grained labels for glass are visualized. We can see that especially glass windows are most common in the top-left corner, as one would expect from the previously mentioned artistic convention to have light originate from the top-left.