

# Reconstruction of the image space depicted in paintings

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## Summary

In the paper, we report on the analysis of the image space depicted on paintings utilizing methods of computer vision. The aim was to find out whether one can recover the spatial organization of a painting based on detection of faces. The analysis was conducted on the two data sets, consisting of 43 and 3356 paintings. First, 3D coordinates of faces were determined. Then, a plane or a paraboloid was fitted to the faces on every painting. Images were therefore described in terms of the angle between the fitted plane and the picture plane. The bigger the angle between both planes, the deeper the picture space depicted.

The analysis of the smaller data set was conducted utilizing clustering based on the angles between the planes. Additionally, clustering was employed for the analysis based on the plane equation coefficients. It was concluded that paintings, for which distances between depicted faces and the surface of the image were highly variable, and paintings, for which these distances were approximately the same, were being assigned to different clusters.

The analysis of the larger data set included paraboloids fitted to the points corresponding to the faces, and the facial orientations were considered. Weak positive correlation between the time of the painting's origin and the angle between the planes was determined. Also, clustering based on planes and based on paraboloids was shown to be independent.