A New Algorithm of Shape-from-shading (SFS) Based on Simulated Annealing

Abstract:
We estimate the proportions of Lambertian and specular components in the hybrid reflection model, to obtain better surface normal, then recover the shape of objects. In this paper, we develop a probability algorithm based on simulated annealing, assuming the posteriori probability of each component as its proportion. Once the algorithm converges, and the proportions are available, we reconstruct the specular reflectance to remove the specular highlights from the original image. Then we are able to re-apply the shape-from-shading technique to the residual reflectance component to get better recovery results

Highlights Removal:
Locate the highlights zone and then remove highlights from it to get better SFS results.

Tools: Open CV, Visual C++, Matlab

Executive Files: see attachments.

Experiments(demo only):

1 Vase

Original image (picture from paper Hossein Ragheb[1])

Image after specular removal

difference

figure 1

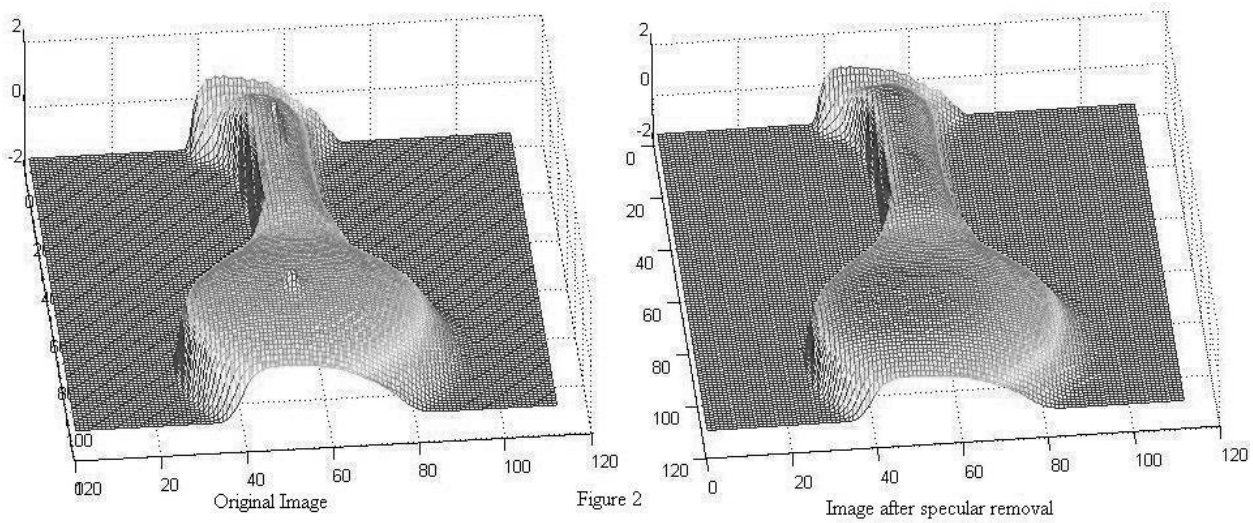


Figure 2

2 Human face

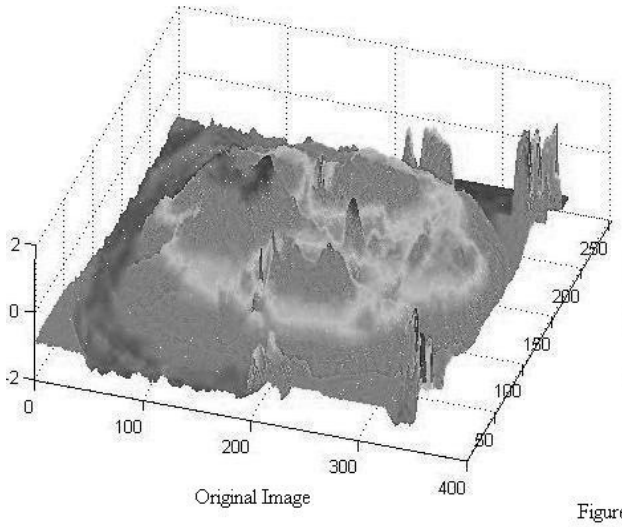
Original image

(picture from Yale Face Database)

Image after specular removal

difference

figure 3



Original Image

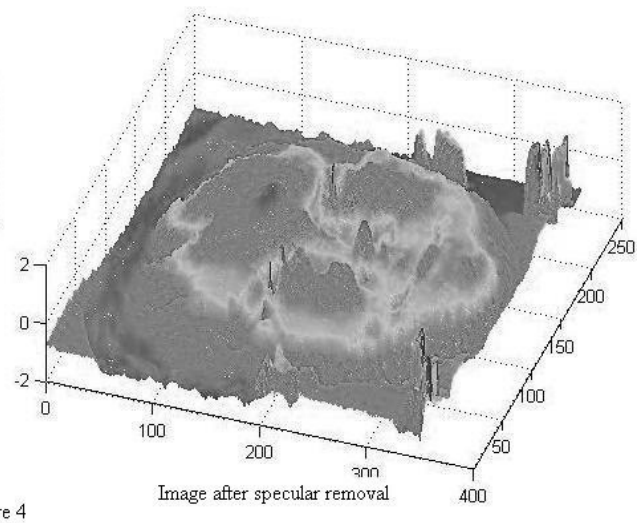


Image after specular removal

Figure 4