
Shape from stereo

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Input Images

```
im1 = rgb2gray(imread('babylview1.png'));  
im2 = rgb2gray(imread('babylview5.png'));  
figure(); imshow(im1); title('Input Image 1')  
figure(); imshow(im2); title('Input Image 2')  
imwrite(im1, 'babylview1.jpg', 'jpg');  
imwrite(im2, 'babylview5.jpg', 'jpg');
```

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Input Image 1



Input Image 2



Extracting Relevant Features

We use SIFT algorithm to extract relevant features to help us get corresponding points so that we can calculate the disparity and get the depth map.

```
[common1, common2] = ourmatch('babylview5.jpg', 'babylview1.jpg');
```

```
Finding keypoints...  
6388 keypoints found.  
Finding keypoints...  
6734 keypoints found.
```

Calculating Disparity

We have the corresponding points in common1 and common2 array. i'th row in common1 corresponds to the i'th point in common2

```
disp = sum(((common1-common2).^2), 2);  
figure(); title('Disparity Plot')  
plot(disp)  
depth = 1./disp;  
scaled_depth = 255*(depth-min(depth))./(max(depth)-min(depth));  
position1 = round(common1);
```

```

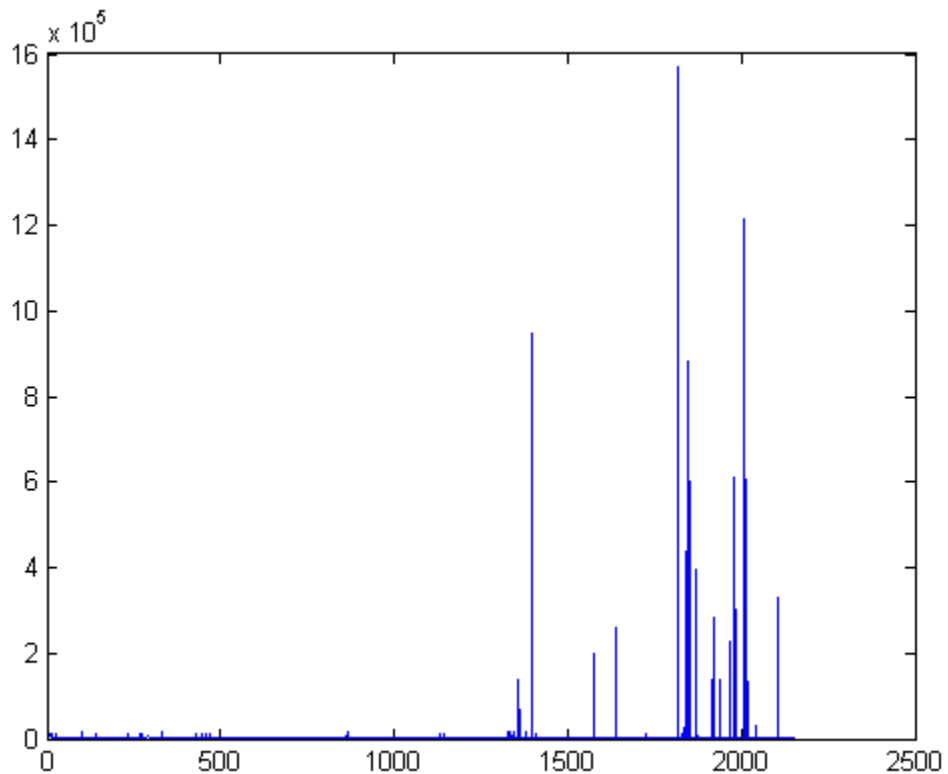
position1(position1<1) = 1;
depth_map = zeros(size(im1));
for i = 1:size(position1);
    depth_map(position1(i,:)) = scaled_depth(i);
end
figure()
plot3(position1(:,1), position1(:,2), scaled_depth)
xlabel('X coordinate'); ylabel('Y coordinate'); zlabel('depth');

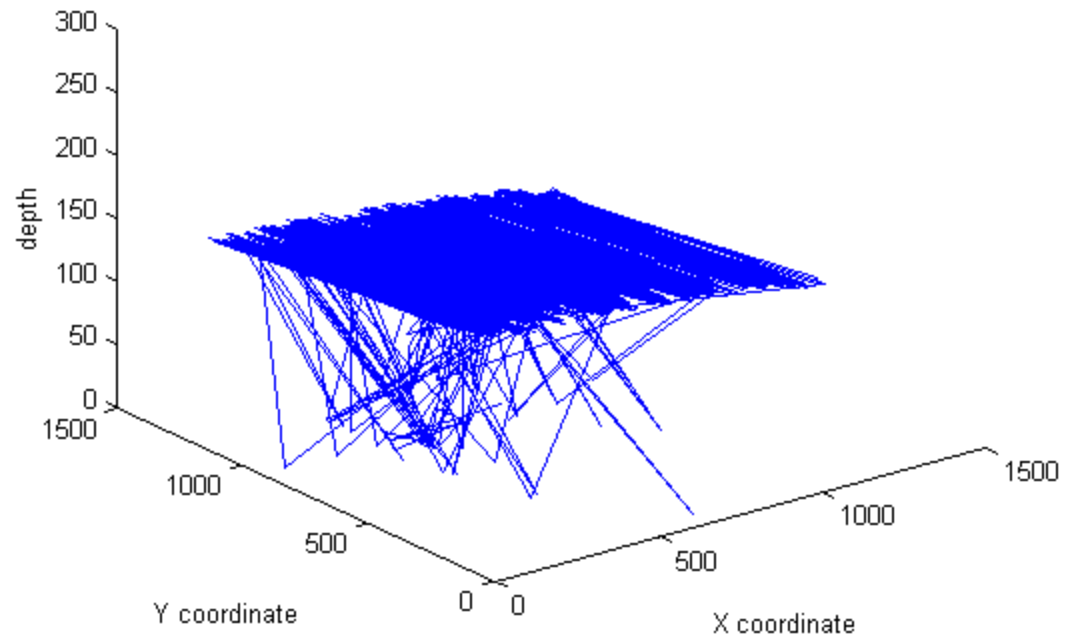
[xi, yi] = meshgrid(1:1110, 1:1240);

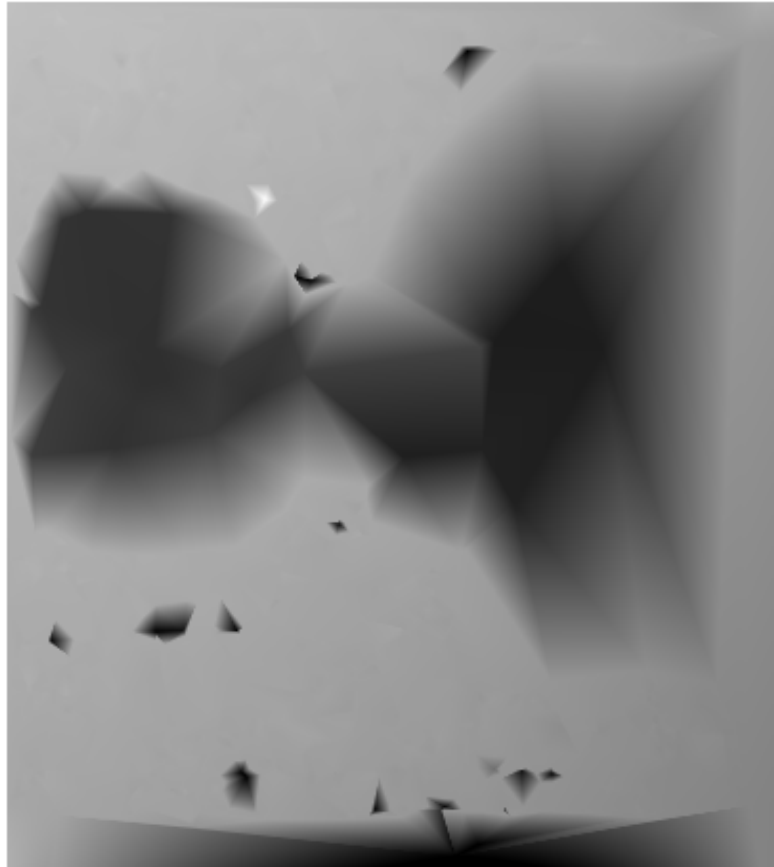
F = scatteredInterpolant(position1(:,1), position1(:,2), scaled_depth);
V = F(xi, yi);
figure()
title('First Depth Map');
imshow(V/255);

```

Warning: Duplicate data points have been detected and removed - corresponding values have been averaged.
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Slightly improvised approach

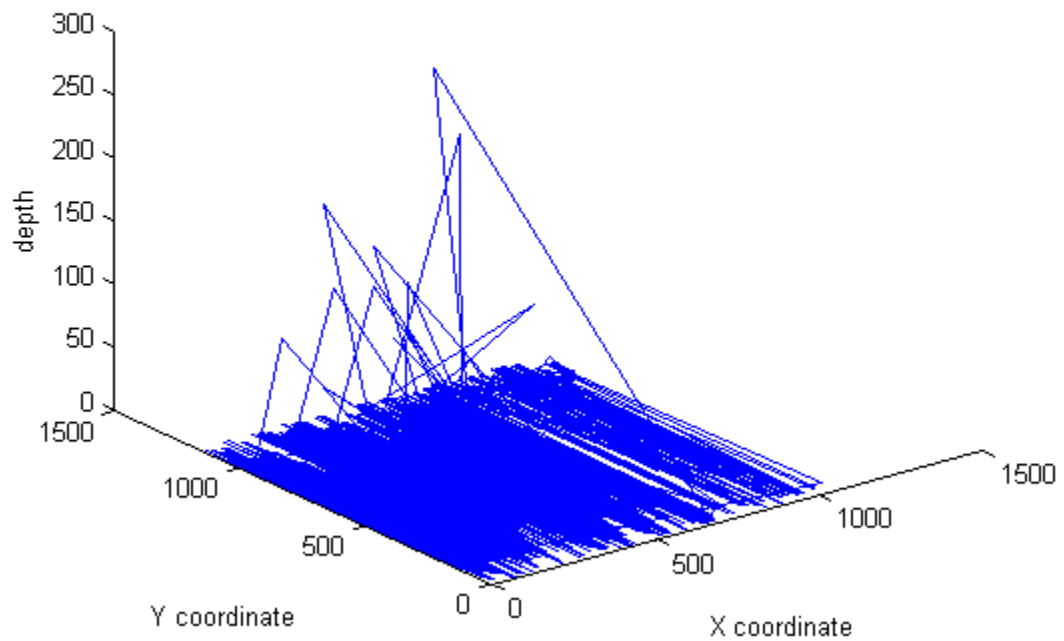
Clearly we need to do some data cleaning before we can get any useful depth data

```
disp(disp<0.05*max(max(disp))) = inf;
depth = 1./disp;
scaled_depth = 255*(depth-min(depth))./(max(depth)-min(depth));
position1 = round(common1);
position1(position1<1) = 1;
depth_map = zeros(size(im1));
for i = 1:size(position1);
    depth_map(position1(i,:)) = scaled_depth(i);
end
figure()
plot3(position1(:,1), position1(:,2), scaled_depth)
xlabel('X coordinate'); ylabel('Y coordinate'); zlabel('depth');

[xi, yi] = meshgrid(1:1110, 1:1240);
```

```
F = scatteredInterpolant(position1(:,1), position1(:,2), scaled_depth, 'nearest',
V = F(xi, yi);
figure()
title('Second Depth Map');
imshow(V/255);
```

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