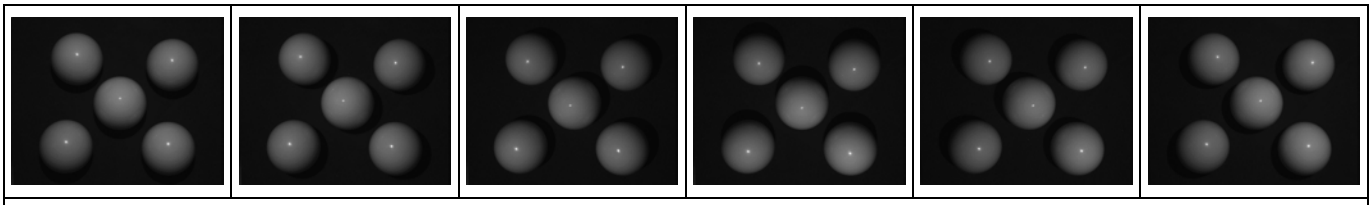
For calibration lights positions

Step 1: Fix spheres (total number should be more than 1) on a plane parallel to the image plane of the camera.

Step 2: take photos of spheres in lighting order, and stored them in a folder, like "D:\ calibrate_sphere"; let photos name as their taking order.

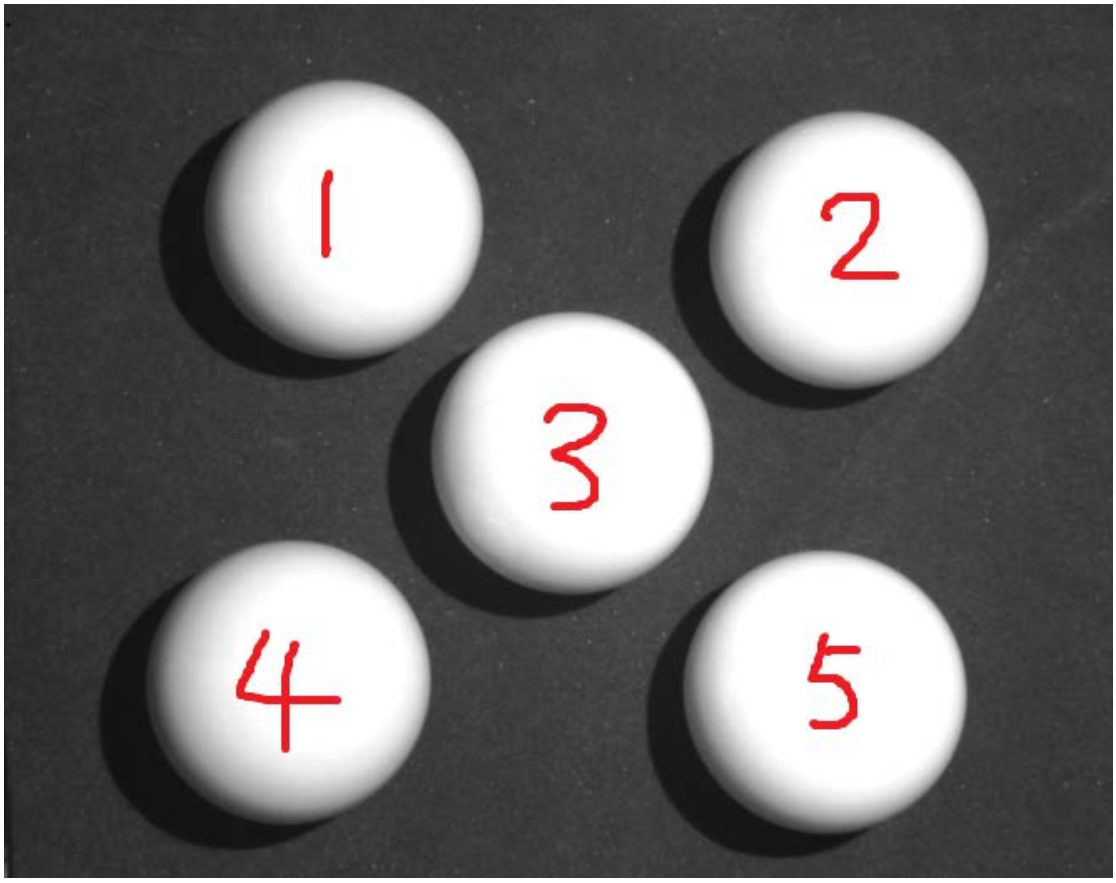
Notice that, sphere photos cannot be too bright or too dark. The reasonable ones should be like in follows.



The photos of five spheres under six LEDS lighting in turn.

Step 3: Label each sphere index, and let this index as the order of the associated radius stored in vector R.

For example,



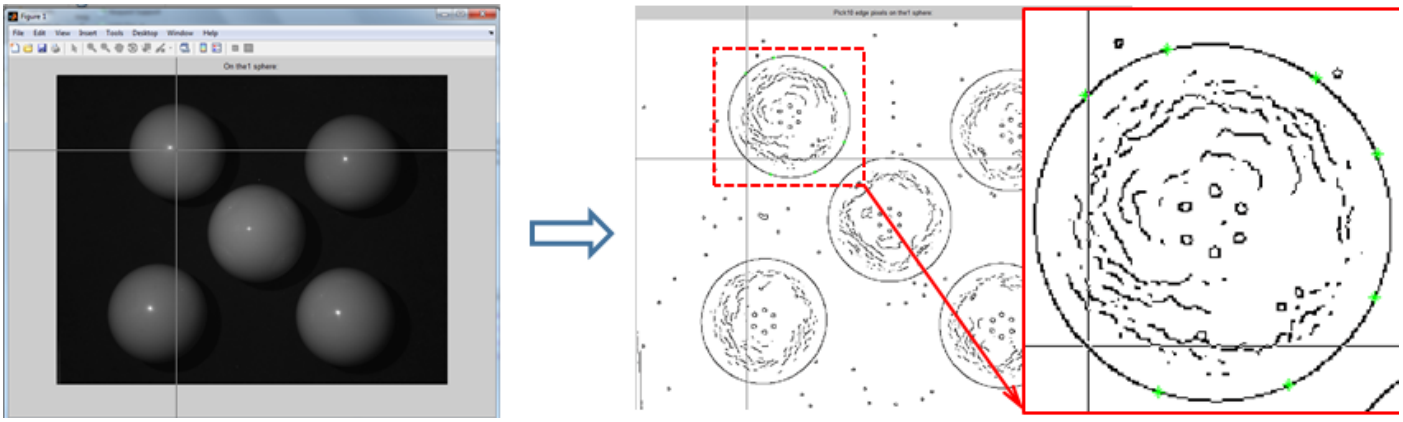
Labels of the above five spheres. The associated radius vector is "R=[26.160, 26.230, 26.305, 26.185, 26.130]" in millimeter.

Notice that label the spheres at will, but the labeling order should be written down, since further calibration will repeated use it.

Step 4: running "wholeLightCal.m", as the command in follows,

```
>> wholeLightCal(R,folen);
Enter the  path of the folder storing calibration spheres:
D:[redacted]\calibrate_sphere
Enter the  format of images including dot, like ".bmp":
.bmp
Enter the  total number of light sources:
6
Pick sphere center on the1 sphere:
```

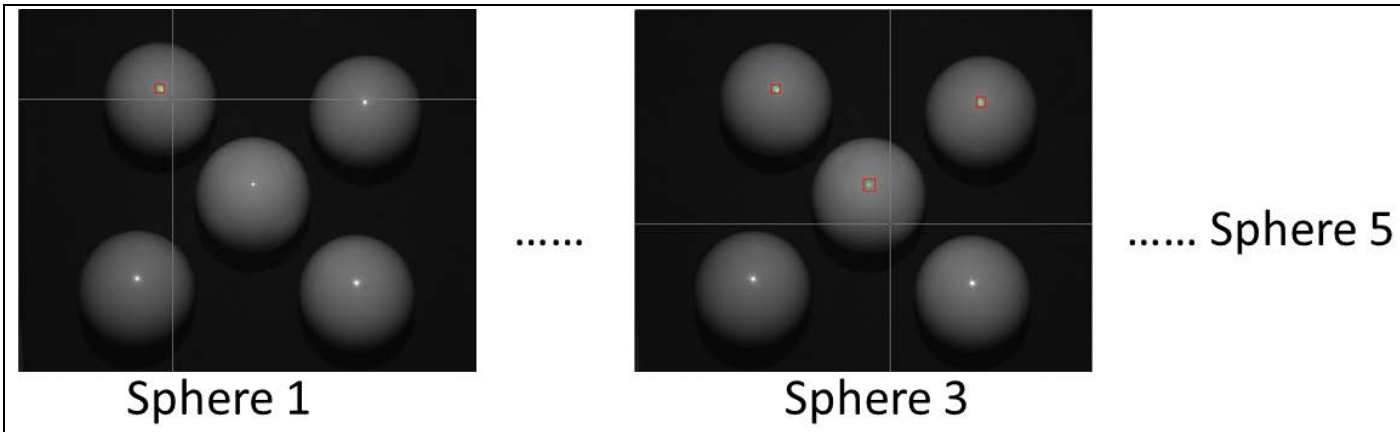
From the first sphere to the last one (in the labeling order), the program automatically requires users to select a rough “sphere center” on image, and then carefully select total ten pixels on its associated contour. For example,



Selection the center and contour pixels on the first sphere.

Such process repeated for the rest spheres.

Then the program automatically requires the frame selection for the brightest spots (**caused by the associated light sources**) on the five spheres in order (as labeled at beginning). For example,



Spot selections for spheres on the first lighting image.

Such process repeats for the rest images of different lighting conditions.

When the calibration completes, light positions are stored in “lightPara.mat” in the folder of sphere images, like “D:\ calibrate_sphere”.

For reconstructions:

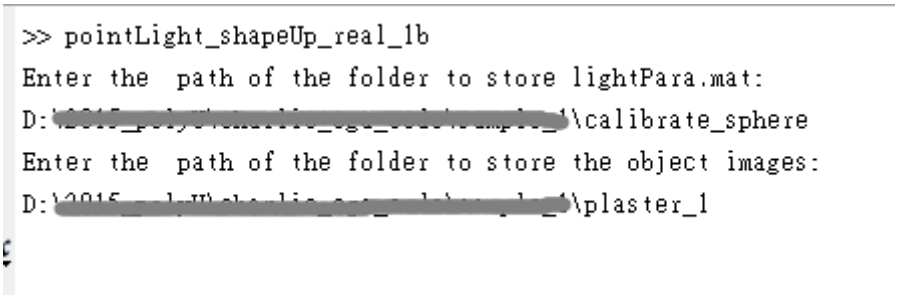
Our algorithm is limited to the object with occluding boundary being on a plane.

Step 1: place the object in front of camera, with its occluding boundary being on the plane passing all the sphere centers.

Step 2: take photos in the lighting order, and name the photos with this order. All photos should be stored in another folder (different to the folder of spheres photos), like "D:\ plaster_1"

Step 3: create a mask to extract the interested part. The mask should be named "mask" (with the same image format of the object photos). The mask image should be contained in the folder of object photos.

Step 4: running "pointLight_shapeUp_real_1b.m", as following command,



When it is completed, the reconstruction results is stored in an OBJ file named "results_obj.obj". Load this file into MeshLab to see the shape.