```
V = [];
for i = 1:4
    H_temp = eval(['Hnew' num2str(i)]);
    h1 = H_temp(:,1);
    h2 = H_temp(:,2);
    h3 = H_temp(:,3);

    v11 = [h1(1)*h1(1), h1(1)*h1(2)+h1(2)*h1(1), h1(2)*h1(2), h1(3)*h1(1)+h1(1)*h1(3),
    v12 = [h1(1)*h2(1), h1(1)*h2(2)+h1(2)*h2(1), h1(2)*h2(2), h1(3)*h2(1)+h1(1)*h2(3),
    v22 = [h2(1)*h2(1), h2(1)*h2(2)+h2(2)*h2(1), h2(2)*h2(2), h2(3)*h2(1)+h2(1)*h2(3),

    V = [V; v12'; (v11-v22)'];
end

[U, Sigma, V_transpose] = svd(V);

b = V_transpose(:,end);

B11 = b(1);
B12 = b(2);
B22 = b(3);
B13 = b(4);
B23 = b(5);
B33 = b(6);

B = [B11, B12, B13; B12, B22, B23; B13, B23, B33];

v0 = (B12*B13 - B11*B23)/(B11*B22 - B12^2);
lambda = B33 - (B13^2 + v0*(B12*B13-B11*B23))/B11;
alpha = sqrt(lambda/B11);
beta = sqrt(lambda*B11/(B11*B22-B12^2));
gamma = -B12*alpha^2*beta/lambda;
u0 = gamma*v0/alpha - B13*alpha^2/lambda;

A = [alpha, gamma, u0; 0, beta, v0; 0, 0, 1];

for i = 1:4
    H_temp = eval(['Hnew' num2str(i)]);
    h1 = H_temp(:,1);
    h2 = H_temp(:,2);
    h3 = H_temp(:,3);

    lambda_r = 1/ norm(A\h1);
    r1 = lambda_r*(A\h1);
    r2 = lambda_r*(A\h2);
    r3 = cross(r1,r2);
    t(:,i)  = lambda_r*(A\h3);

    R = [r1, r2, r3];
```

```
    [U,S,Vprime] = svd(R);
    Rotation(:,:,i) = U*Vprime;

    disp(["Rotation matrix R for images" files(i)])
    disp(Rotation(:,:,i))
    disp(["Translation vector for images" files(i)])
    disp(t(:,i))

    x1 = p_correct(:,1,i);
    y1 = p_correct(:,2,i);

    H = eval(['Hnew' num2str(i)]);
    points_projection = H*grid_coordinates';
    for j=1:length(points_projection)
        points_projection(:,j) = points_projection(:,j) /points_projection(3,j);
    end
    points_projection = points_projection';

    x2 = points_projection(:,1);
    y2 = points_projection(:,2);

    disp(["New Homography Reprojection error for >> " files(i)])
    total_err_reprojection = sum(sqrt((x1(:)-x2(:)).^2 + (x1(:)-x2(:)).^2));
    disp(["Total Reprojection Error (as Euclidean Distance) >> " total_err_reprojectio
    disp(["Average Reprojection Error per point >> " total_err_reprojection/80]);

    H = eval(['H' num2str(i)]);
    points_projection_2 = H*grid_coordinates';
    for j=1:length(points_projection_2)
        points_projection_2(:,j) = points_projection_2(:,j) /points_projection_2(3,j);
    end
    points_projection_2 = points_projection_2';

    x2 = points_projection_2(:,1);
    y2 = points_projection_2(:,2);

    disp(["Part 2 Homography Reprojection error for >> " files(i)]);
    total_err_reprojection = sum(sqrt((x1(:)-x2(:)).^2 + (x1(:)-x2(:)).^2));
    disp(["Total Reprojection Error (as Euclidean Distance) >> " total_err_reprojectio
    disp(["Average Reprojection Error per point >> " total_err_reprojection/80]);
end
```

```
    "Rotation matrix R for images"    "images2"
    0.2633   -0.8597   -0.4377
    0.5796    0.5037   -0.6406
    0.7712   -0.0850    0.6309
    "Translation vector for images"    "images2"
 -154.5660
  104.6985
  388.9131
    "New Homography Reprojection error for >> "    "images2"
    "Total Reprojection Error (as Euclidean Di…"    "110.7128"
```

```
   "Average Reprojection Error per point >> "    "1.3839"
   "Part 2 Homography Reprojection error for …"    "images2"
   "Total Reprojection Error (as Euclidean Di…"    "346.7359"
   "Average Reprojection Error per point >> "    "4.3342"
   "Rotation matrix R for images"    "images9"
   0.7589    0.6267    0.1769
  -0.5408    0.7579   -0.3647
  -0.3626    0.1811    0.9142
   "Translation vector for images"    "images9"
-100.5481
  94.8001
 332.2943
   "New Homography Reprojection error for >> "    "images9"
   "Total Reprojection Error (as Euclidean Di…"    "109.402"
   "Average Reprojection Error per point >> "    "1.3675"
   "Part 2 Homography Reprojection error for …"    "images9"
   "Total Reprojection Error (as Euclidean Di…"    "238.7597"
   "Average Reprojection Error per point >> "    "2.9845"
   "Rotation matrix R for images"    "images12"
   0.9630   -0.2158    0.1612
   0.2069    0.9759    0.0700
  -0.1724   -0.0341    0.9844
   "Translation vector for images"    "images12"
-151.2509
 105.8987
 442.8284
   "New Homography Reprojection error for >> "    "images12"
   "Total Reprojection Error (as Euclidean Di…"    "141.07"
   "Average Reprojection Error per point >> "    "1.7634"
   "Part 2 Homography Reprojection error for …"    "images12"
   "Total Reprojection Error (as Euclidean Di…"    "409.651"
   "Average Reprojection Error per point >> "    "5.1206"
   "Rotation matrix R for images"    "images20"
   0.5847    0.6470    0.4893
  -0.8042    0.5416    0.2448
  -0.1066   -0.5367    0.8370
   "Translation vector for images"    "images20"
-122.8887
  25.6874
 395.6558
   "New Homography Reprojection error for >> "    "images20"
   "Total Reprojection Error (as Euclidean Di…"    "145.4892"
   "Average Reprojection Error per point >> "    "1.8186"
   "Part 2 Homography Reprojection error for …"    "images20"
   "Total Reprojection Error (as Euclidean Di…"    "250.5126"
   "Average Reprojection Error per point >> "    "3.1314"
```