```
video = VideoReader('..\pic\targetVideo.MP4');
nFrames=video.NumberOfFrames;
vh=video.Height;
vw=video.Width;
%生成的视频
% aviobj = VideoWriter('..\pic\newvideo1.avi');
%设置帧率
% aviobj.FrameRate = 25;
% open(aviobj);
%新封面
cover=imread('..\pic\cover.jpg');
cover=im2double(cover);
[h1,w1,d1] = size(cover);
xs1 = [1 w1 w1 1]';
ys1 = [1 1 h1 h1]';
%在第一帧取角点
frame1=read(video,1);
frame1=im2double(frame1);
imshow(frame1);
[x,y]=ginput(4);   %左上 右上 右下 左下

[h2,w2,d2] = size(frame1);
xs2=double(x);
ys2=double(y);
tf = estimateGeometricTransform([xs1 ys1],[xs2 ys2],'projective');
src_registered = imwarp(cover,tf,'OutputView',imref2d(size(frame1)));
mask= sum(src_registered,3)~=0;
idx = find(mask);
frame1(idx) = src_registered(idx);
```

```
frame1(idx+h2*w2) = src_registered(idx+h2*w2);
frame1(idx+2*h2*w2) = src_registered(idx+2*h2*w2);
figure;
imshow(frame1);
hold on,
line([x(1),x(2)],[y(1),y(2)],'Color','r','LineWidth',2);
line([x(2),x(3)],[y(2),y(3)],'Color','r','LineWidth',2);
line([x(3),x(4)],[y(3),y(4)],'Color','r','LineWidth',2);
line([x(4),x(1)],[y(4),y(1)],'Color','r','LineWidth',2);

srcp=[y,x];

%从第 265 帧获取手部颜色，便于之后抠图
pic1=read(video,305);
pic1=im2double(pic1);
pic1=rgb2hsv(pic1);

R1=55/255;
pos1=[827 638];
pos2=[816 573];
pos3=[895 558];
a1 = [pic1(pos1(2),pos1(1),1) pic1(pos1(2),pos1(1),2) pic1(pos1(2),pos1(1),3)];
a2 = [pic1(pos2(2),pos2(1),1) pic1(pos2(2),pos2(1),2) pic1(pos2(2),pos2(1),3)];
a3=[pic1(pos3(2),pos3(1),1) pic1(pos3(2),pos3(1),2) pic1(pos3(2),pos3(1),3)];

for k=1:nFrames-1
    % 获得相邻两帧
    frame1=read(video,k);
    frame1=im2double(frame1);
```

```
        frame2=read(video,k+1);
        frame2=im2double(frame2);
        % 求取两帧的 SURF 特征点
        fg1=rgb2gray(frame1);
        p1=detectSURFFeatures(fg1);
        [f1,p1]=extractFeatures(fg1, p1);

        fg2=rgb2gray(frame2);
        p2 = detectSURFFeatures(fg2);
        [f2, p2] = extractFeatures(fg2, p2);

        %特征点匹配
        pair=matchFeatures(f1, f2);

        point1 = p1.Location;
        point2 = p2.Location;
        % 求解变换矩阵
        tform = estimateGeometricTransform([point1(pair(:,1),2) point1(pair(:,1),1)],[point2(pair(:,2),2)
point2(pair(:,2),1)],'projective');
        % 使用变换矩阵求得下一帧角点位置
        destp=transformPointsForward(tform,srcp);

        if k>=250 && mod(k,5)==0   % 霍夫变换矫正
            I=frame2;
            [M,N,dig]=size(I);
            %对图片做处理，方便后续直线检测
            I=rgb2hsv(I);
            R2=70/255;
            color1=[0.533333333333333 0.724637681159420 0.270588235294118];
```

```
color2=[0.552757793764988 0.615044247787611 0.886274509803922];
D1 = (I(:,:,1)-color1(1)).^2+(I(:,:,2)-color1(2)).^2+(I(:,:,3)-color1(3)).^2;
mask1 = D1<=R2*R2;
D2 = (I(:,:,1)-color2(1)).^2+(I(:,:,2)-color2(2)).^2+(I(:,:,3)-color2(3)).^2;
mask2 = D2<=R2*R2;
m_ask=mask1|mask2;
m_ask=~bwareaopen(~m_ask,10000);
I=hsv2rgb(I);
%霍夫变换
bw=edge(m_ask,'sobel');
[H,theta,rho] = hough(bw);
P = houghpeaks(H,7,'threshold',ceil(0.3*max(H(:))));
lines = houghlines(bw,theta,rho,P);
max_len = 0; count =0;
for kp = 1:length(lines)
    xy = [lines(kp).point1; lines(kp).point2];
end
cross=[];
%找交点
for i=1:length(lines)-1
      for j=i+1:length(lines)
            xy1 = [lines(i).point1; lines(i).point2];
            aa1 = xy1(1,2) -xy1(2,2);
            bb1 = xy1(2,1) -xy1(1,1);
            cc1 = xy1(1,1) *xy1(2,2) - xy1(2,1) * xy1(1,2);
            xy2 = [lines(j).point1; lines(j).point2];
            aa2 = xy2(1,2) -xy2(2,2);
            bb2 = xy2(2,1) -xy2(1,1);
            cc2 = xy2(1,1) *xy2(2,2) - xy2(2,1) * xy2(1,2);
```

```
                    d = aa1*bb2 - aa2*bb1;


                    if d~=0
                        cross_x = (bb1*cc2 - bb2*cc1)/d;
                        cross_y = (aa2*cc1 - aa1*cc2)/d;
                        cross=[cross;cross_y,cross_x];
                    end
                end
            end
            %矫正当前 destp 位置，移至最近交点
            dis=pdist2(destp,cross);
            [min_dis,index]=min(dis,[],2);
            %有距离小于 10 的，矫正
            for q=1:4
                if min_dis(q,1)<10
                    destp(q,:)=cross(index(q,1),:);
                end
            end
        end
        %换封面
        if k>=265 && k<=348   %需要对手部做处理
            %获得 mask
            frame2=rgb2hsv(frame2);
            D1 = (frame2(:,:,1)-a1(1)).^2+(frame2(:,:,2)-a1(2)).^2+(frame2(:,:,3)-a1(3)).^2;
            mask1 = D1<=R1*R1;
            D2 = (frame2(:,:,1)-a2(1)).^2+(frame2(:,:,2)-a2(2)).^2+(frame2(:,:,3)-a2(3)).^2;
            mask2 = D2<=R1*R1;
            D3 = (frame2(:,:,1)-a3(1)).^2+(frame2(:,:,2)-a3(2)).^2+(frame2(:,:,3)-a3(3)).^2;
            mask3 = D3<=R1*R1;
```

```
        mm=mask1|mask2|mask3;
        frame2=hsv2rgb(frame2);
        pic2=frame2;
    end
    %对新的封面仿射变换至原封面
    xs2=double(destp(:,2));
    ys2=double(destp(:,1));

    tf = fitgeotrans([xs1 ys1],[xs2 ys2],'projective');
    src_registered = imwarp(cover,tf,'OutputView',imref2d(size(frame2)));
    mask= sum(src_registered,3)~=0;
    idx = find(mask);
    frame2(idx) = src_registered(idx);
    frame2(idx+h2*w2) = src_registered(idx+h2*w2);
    frame2(idx+2*h2*w2) = src_registered(idx+2*h2*w2);

    if k>=265 && k<=348   %对手部处理
        %抠图
        ind=find(mm);
        frame2(ind)=pic2(ind);
        frame2(ind+h2*w2)=pic2(ind+h2*w2);
        frame2(ind+2*h2*w2)=pic2(ind+2*h2*w2);
    end
    %展示
    if mod(k,50)==0
        figure;
        imshow(frame2);
        hold on,
        line([destp(1,2),destp(2,2)],[destp(1,1),destp(2,1)],'Color','r','LineWidth',2);
```

```
            line([destp(2,2),destp(3,2)],[destp(2,1),destp(3,1)],'Color','r','LineWidth',2);
            line([destp(3,2),destp(4,2)],[destp(3,1),destp(4,1)],'Color','r','LineWidth',2);
            line([destp(4,2),destp(1,2)],[destp(4,1),destp(1,1)],'Color','r','LineWidth',2);
            pause(0.01);
        end
%         writeVideo(aviobj,frame2);
        %更新
        srcp=destp;
end
% close(aviobj);
```

```
警告: 图像太大，无法在屏幕上显示；将以 67% 显示
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警告: Converting input data to single.

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警告: Converting input data to single.


Figure
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
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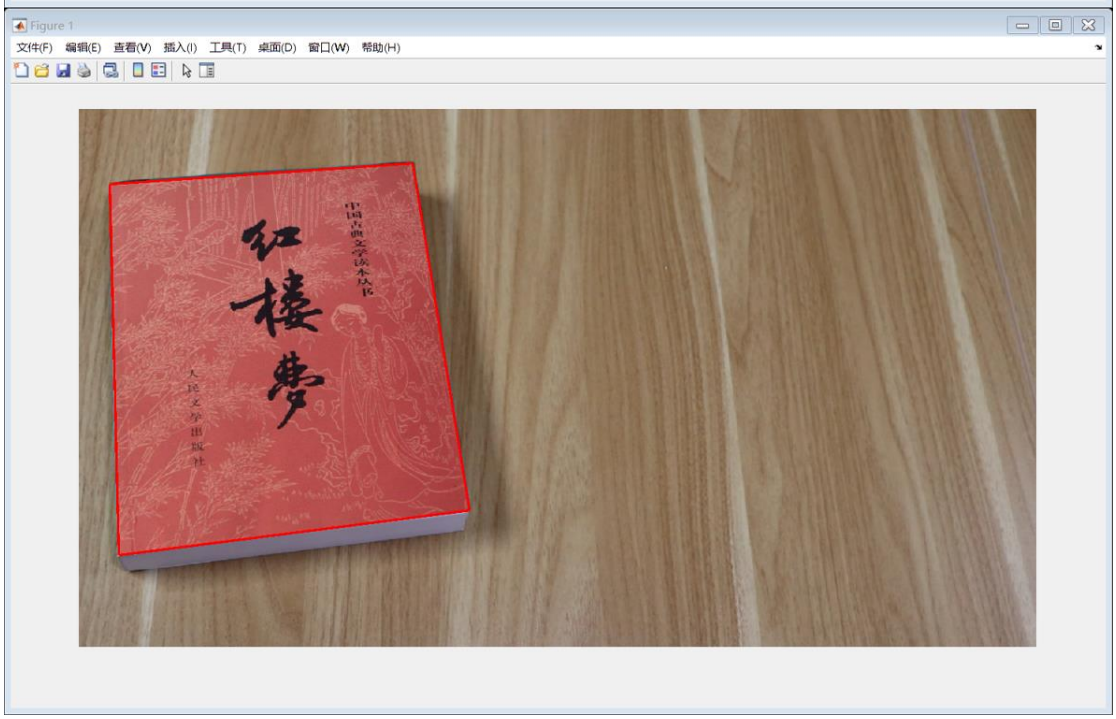
Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
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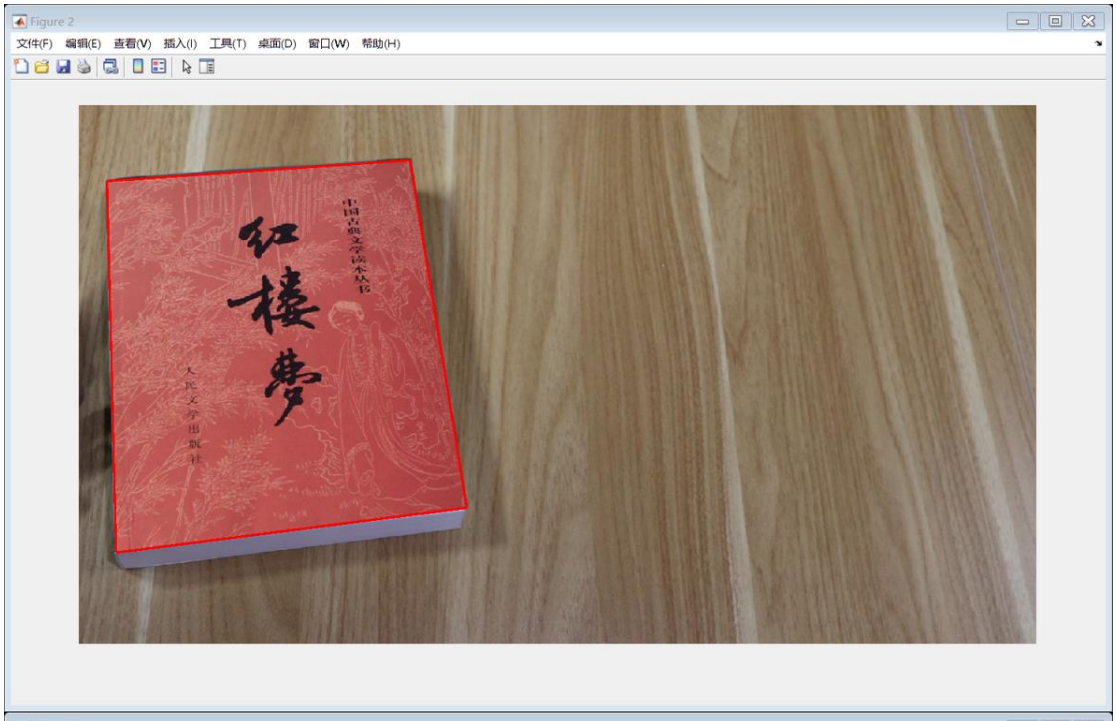
Figure 2
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
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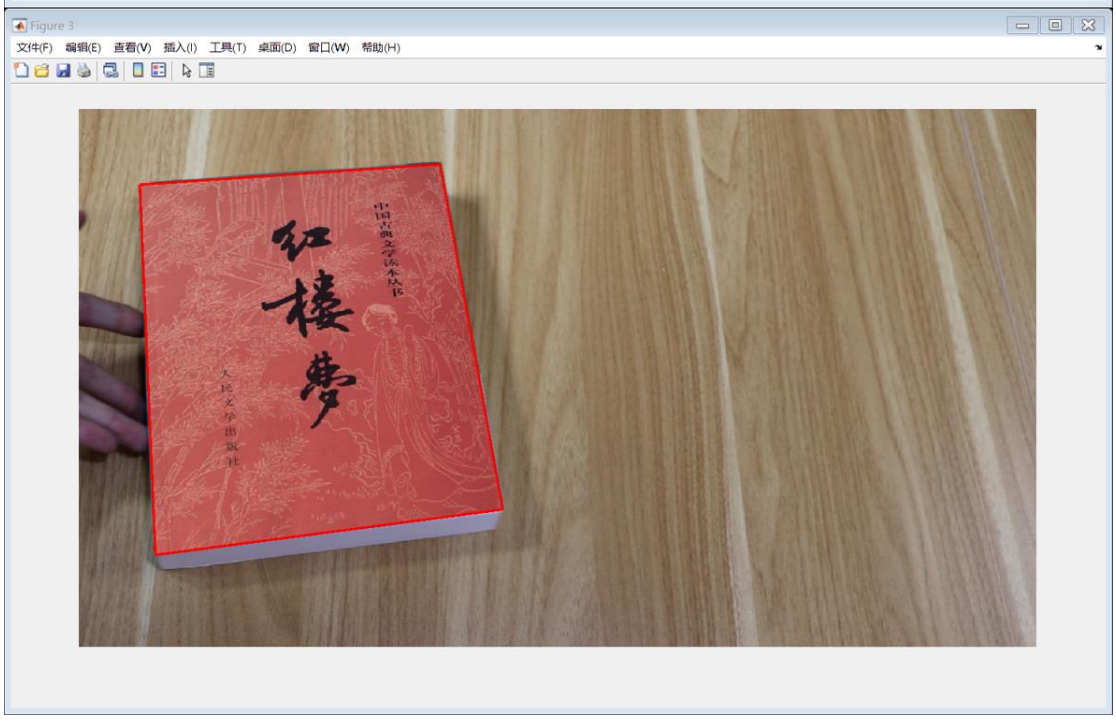
Figure 3
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
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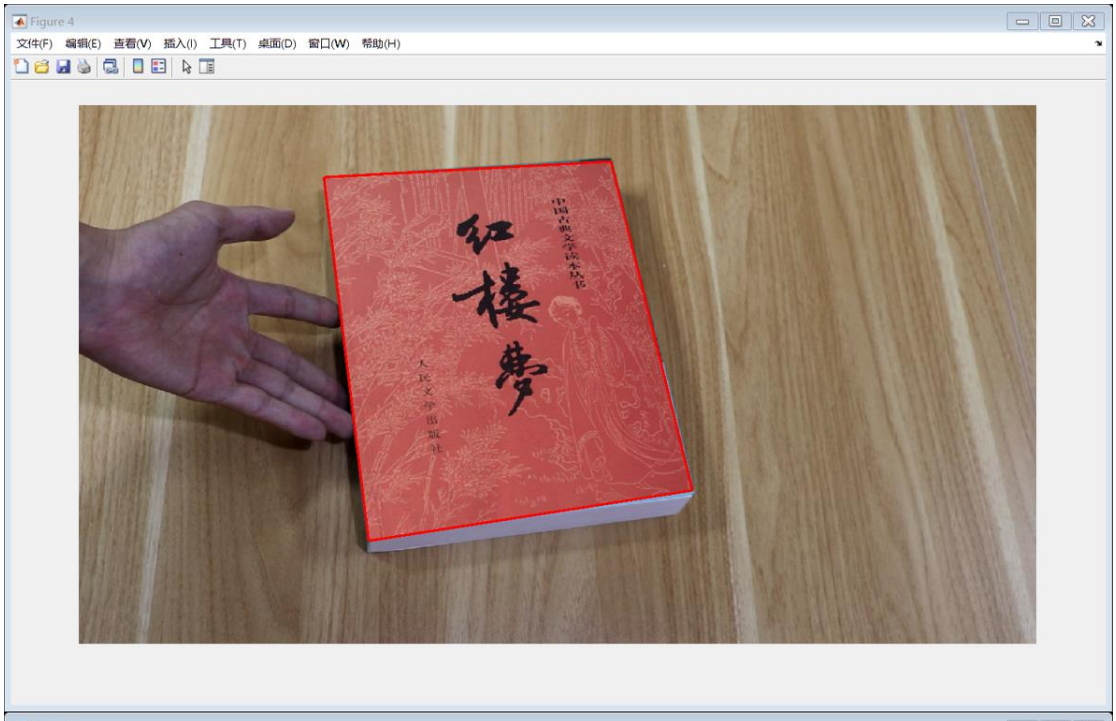
Figure 4
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
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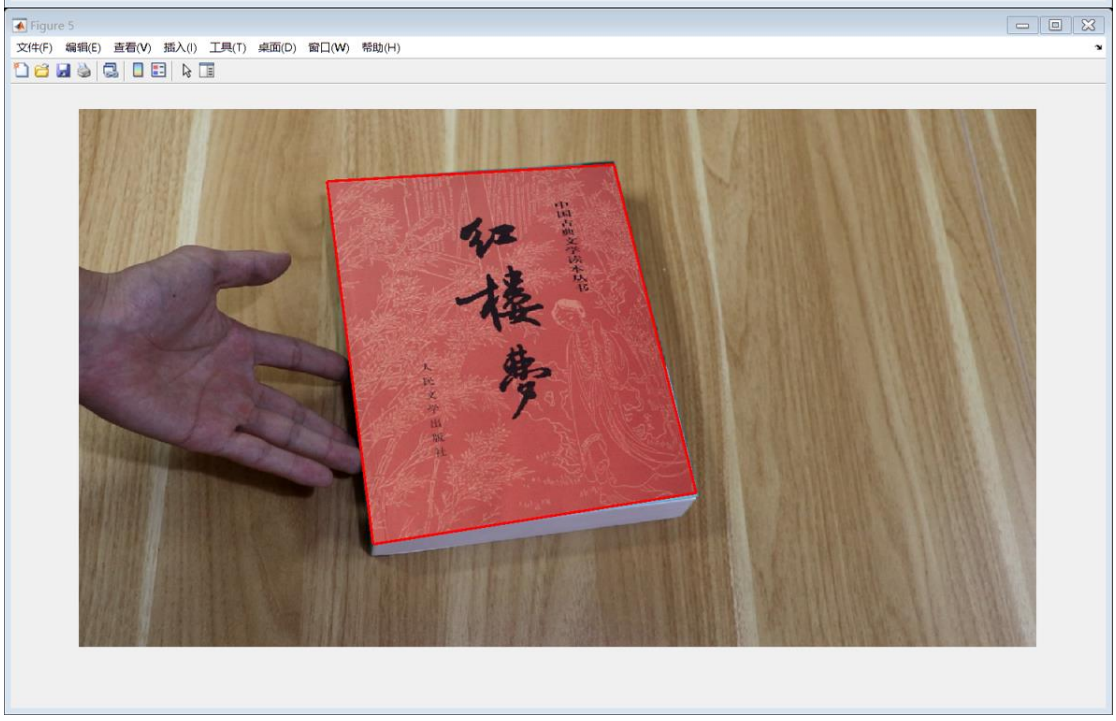
Figure 5
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
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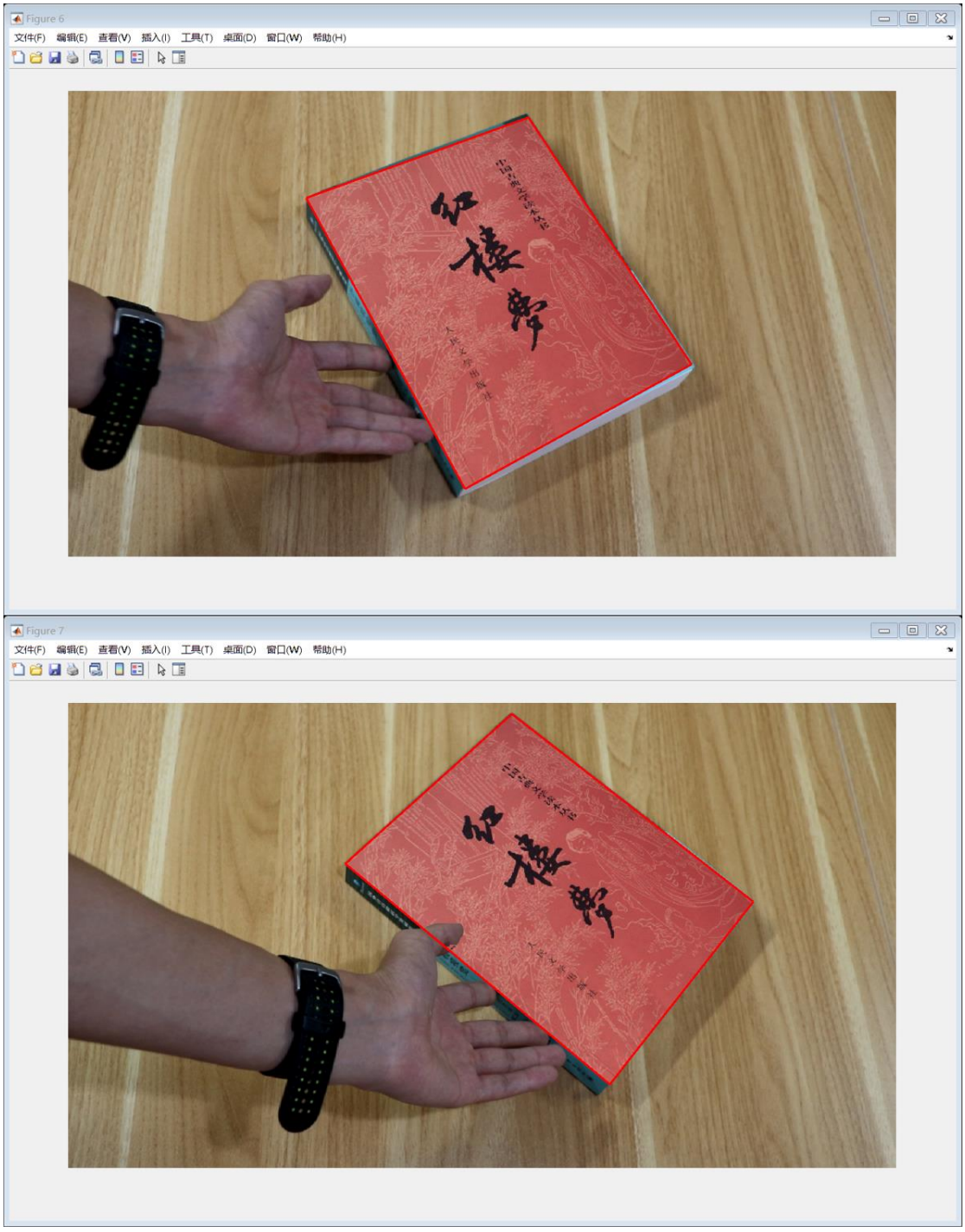
Figure 6
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
Figure 7
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