1 image
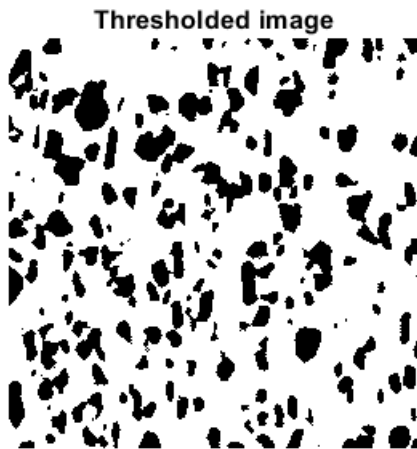
```matlab
[result1,threshold1] = t2t("aluminium.png");
imshow(result1)
title('Thresholded image');
```


Thresholded image

```matlab
disp(['Obtained threshold value: ' num2str(threshold1)]);
```

Obtained threshold value: 104

2 image

```matlab
[result2,threshold2] = t2t("finger.png");
imshow(result2)
title('Thresholded image');
```

Thresholded image


```
disp(['Obtained threshold value: ' num2str(threshold2)]);
```

```
Obtained threshold value: 159
```

3 image

```
[result3,threshold3] = t2t("julia.png");
imshow(result3)
title('Thresholded image');
```
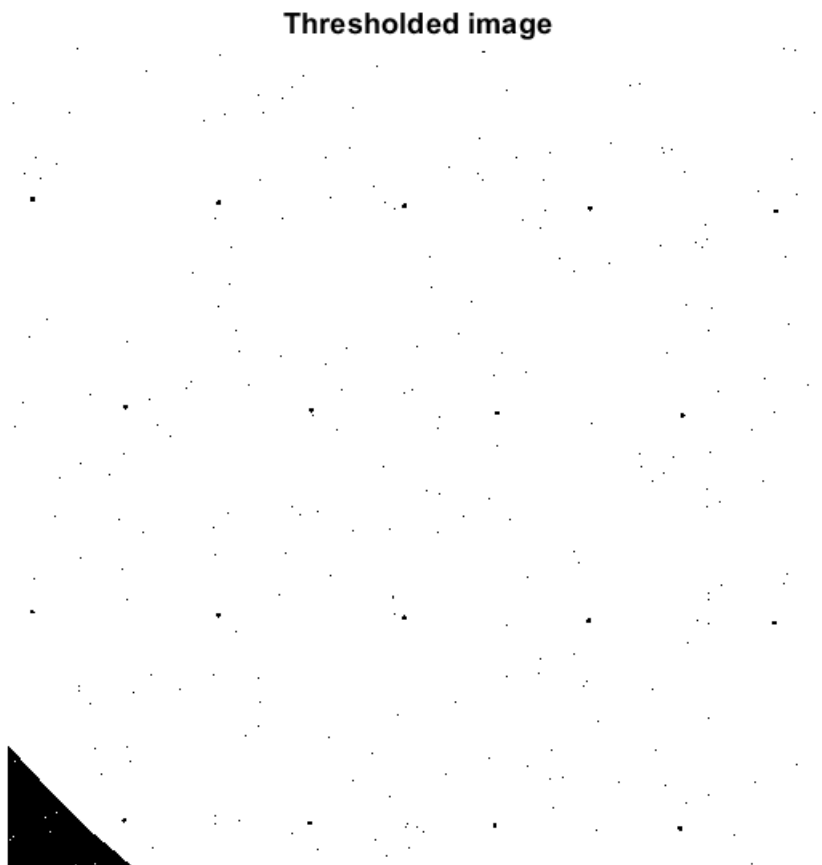
Thresholded image


```
disp(['Obtained threshold value: ' num2str(threshold3)]);
```

```
Obtained threshold value: 150
```

4 image

```matlab
[result4,threshold4] = t2t("phobos.png");
imshow(result4)
title('Thresholded image');
```


Thresholded image

```matlab
disp(['Obtained threshold value: ' num2str(threshold4)]);
```

Obtained threshold value: 63

```matlab
export("t2.mlx");
```

Main function

```matlab
function [result,threshold] = t2t(imagename)
I = imread(imagename);
I = uint8(I);

histogram_val = zeros(1, 256);

for i = 1:size(I, 1)
    for j = 1:size(I, 2)
```

```matlab
            tmp = I(i, j) + 1;
            histogram_val(1, tmp) = histogram_val(1, tmp) + 1;
        end
    end

    S = sum(histogram_val, 2);

    P = zeros(1,256);
    for i = 1:256
        P(1, i) = histogram_val(1, i) / S;
    end

    mean = 0;
    for i = 1:256
        mean = mean + i * P(1, i);
    end

    variance = 0;
    for i = 1:256
        variance = variance + (i - mean)^2 * P(1, i);
    end

    q1 = zeros(1,256);
    q2 = zeros(1,256);

    q1(1, 1) = P(1, 1);
    q2(1, 1) = 1 - q1(1, 1);

    for t = 2:256
        q1(1, t) = q1(1, t-1) + P(1, t);
        q2(1, t) = 1 - q1(1, t);
    end

    mean1 = zeros(1, 256);
    mean1(1, 1) = 0;
    for t = 2:256
        top = q1(1, t-1) * mean1(1, t-1) + t * P(1, t);
        bottom = q1(1, t);

        if(top == 0 && bottom == 0)
            continue;
        else
            mean1(1, t) = top / bottom;
        end
    end

    mean2 = zeros(1, 256);
    mean2(1, 1) = 0;
    for t = 2:256
        top = mean - q1(1, t) * mean1(1, t);
```

4

```matlab
        bottom = 1 - q1(1, t);

        if(top == 0 && bottom == 0)
            continue;
        else
            mean2(1, t) = top / bottom;
        end
    end
end

max_variance = -100;
for t = 1:256
    variance_B = q1(1, t) * q2(1, t) * ((mean1(1, t) - mean2(1, t))^2);

    if(variance_B > max_variance)
        max_variance = variance_B;
        threshold = t;
    end
end

result = I;
for i = 1:size(result, 1)
    for j = 1:size(result, 2)
        if(result(i,j)<=threshold)
            result(i,j) = 0;
        else
            result(i,j) = 255;
        end
    end
end
end
```