

Korelasyon

Şablon Eşleştirme - Template Matching

Şablon nerede?

Sinyal

20	25	30	60	30	20	40	60	10	2
----	----	----	----	----	----	----	----	----	---

Şablon

30	60	30
----	----	----

Çözüm: Korelasyon

Korelasyon - 1D

Şablon

1	2	1
---	---	---

Sinyal

1	1	2	2	1	1	2	2	1	1
---	---	---	---	---	---	---	---	---	---

Korelasyon Sonucu

	5								
--	---	--	--	--	--	--	--	--	--

Şablon nerede?

Sinyal

20	25	30	60	30	20	40	60	10	2
----	----	----	----	----	----	----	----	----	---

Şablon

30	60	30
----	----	----

Korelasyon Sonucu

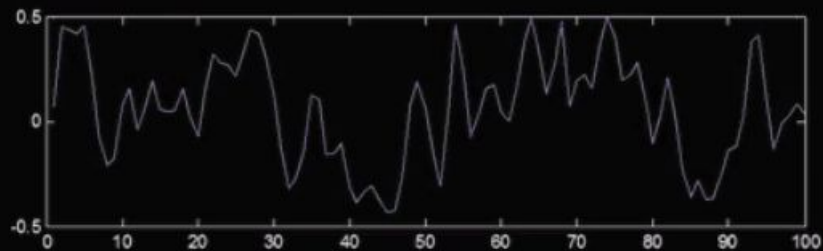
	3000	4350	5400	4200	4300	4800	5100	2460	
--	------	------	------	------	------	------	------	------	--

Matlab

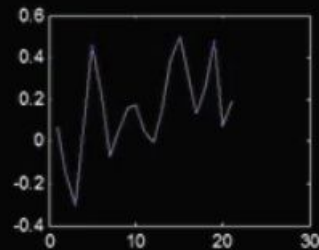
`c = normxcorr2(a,b); surf(c); shading flat;`

1D

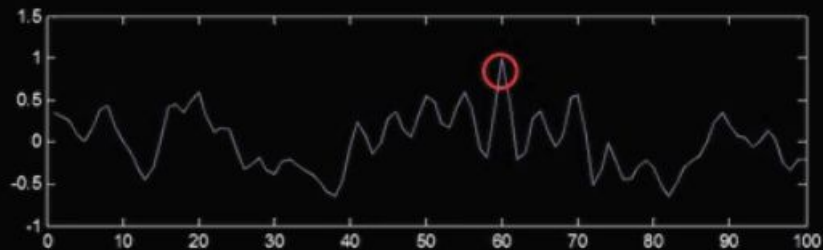
Signal



Filter



Normalized
cross-correlation



1D - KOD

```
% Find template 1D
```

```
pkg load image;
```

```
function index = find_template_1D(t, s)
```

```
    c = normxcorr2(t, s);
```

```
    disp([1:size(c, 2); c]);
```

```
    [maxValue rowIndex] = max(c);
```

```
    index = rowIndex - size(t, 2) + 1;
```

```
endfunction
```

```
s = [-1 0 0 1 1 1 0 -1 -1 0 1 0 0 -1];
```

```
t = [1 1 0];
```

```
%disp('Signal:'), disp([1:size(s, 2); s]);
```

```
%disp('Template:'), disp([1:size(t, 2); t]);
```

```
index = find_template_1D(t, s);
```

```
%disp('Index:'), disp(index);
```

Signal:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
-1	0	0	1	1	1	0	-1	-1	0	1	0	0	-1

Template:

1	2	3	4
0	-1	-1	0

Index:

7

Signal:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
-1	0	0	1	1	1	0	-1	-1	0	1	0	0	-1

Template:

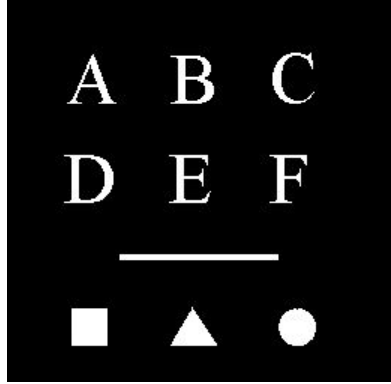
1	2	3	4	5
1	1	1	0	0

Index:

4

2D

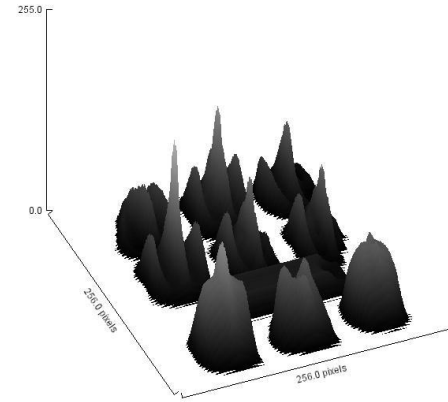
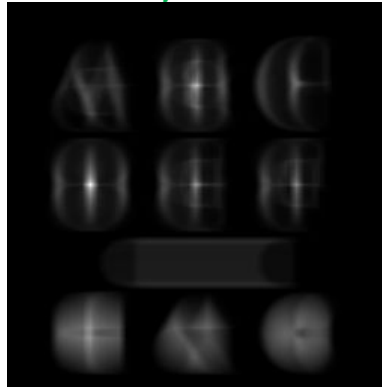
Görüntü



Şablon



Korelasyon Sonucu



2D

Test Image



Template



Template Matching Result



0.92

0.84

0.92

1.00

Matched Filtering Result



0.64

0.77

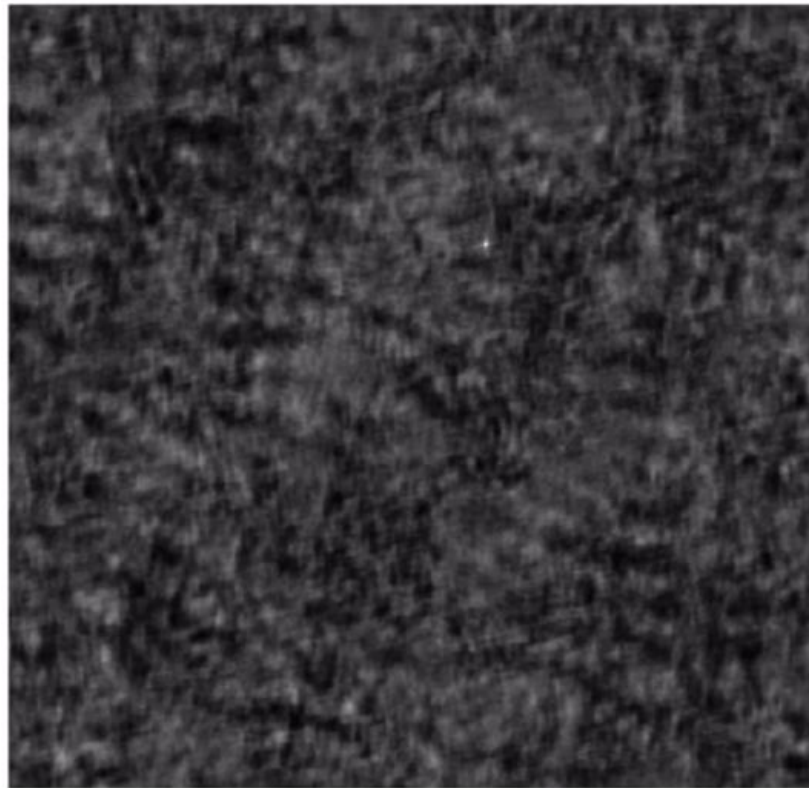
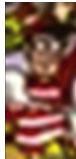
0.73

1.00

aldo nerede?

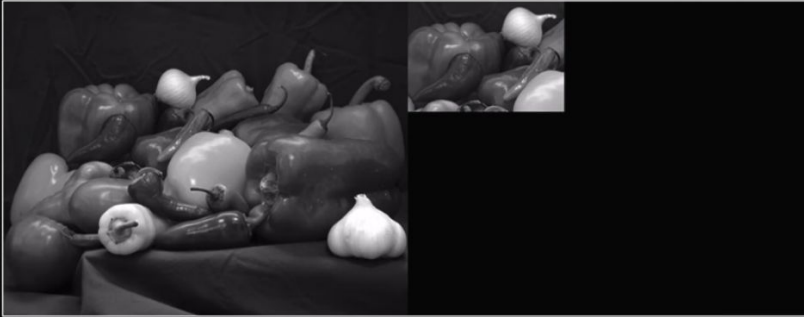


aldo

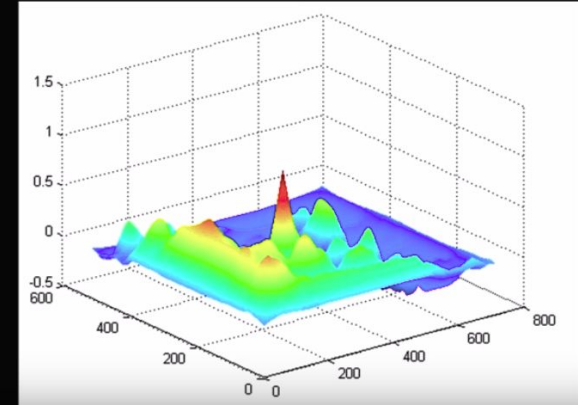


2D - KOD

```
onion = rgb2gray(imread('onion.png'));  
peppers = rgb2gray(imread('peppers.png'));  
imshowpair(peppers,onion,'montage')
```



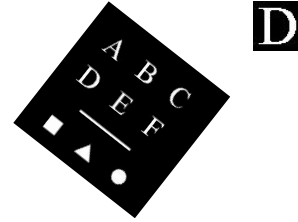
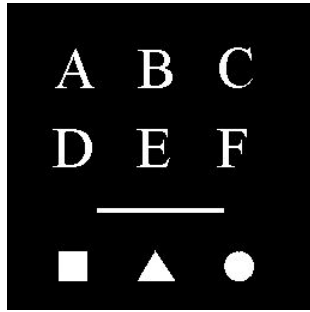
```
c = normxcorr2(onion,peppers);  
figure, surf(c), shading flat;
```



Korelasyondan başka açıyada bakılabilir:

$$\theta = \arccos \frac{h^{\circ} f}{\|h\| \|f\|}$$

Korelasyon ne zaman iş görmez?



?

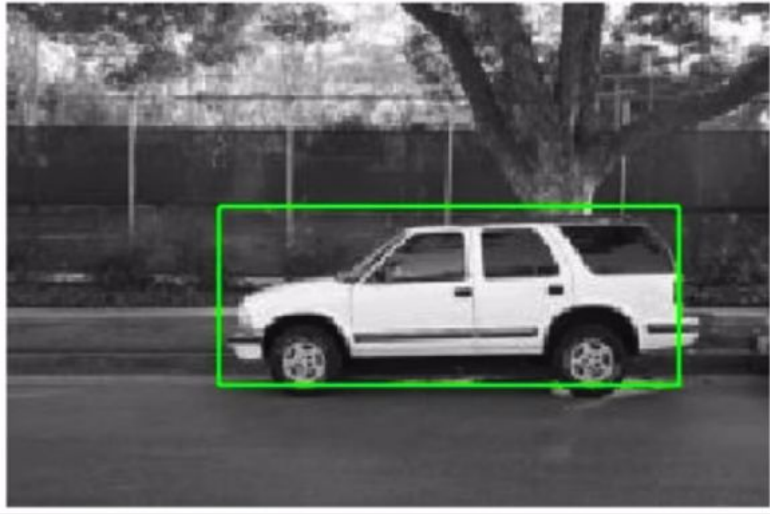
Literatürdeki Çözümler:
SIFT, SURF, RIFF algoritmaları

Nerelerde uygun?



Burada uygun

Eğer büyüklük (scale), açı (rotation) ve genel özellikler uygunsa, şablon eşleştirme oldukça anlamlı sonuç verir.



Detected template



Template