

National Taiwan University
Computer Organization and Assembly Languages
Final Project – FINDING NEMO

There are 3.7 trillion fish in the ocean.*
They're looking for one.

Disney · Pixar

FINDING

NEMO

May 30

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There are 3.7 trillion fish in the ocean.
We are looking for one.

On Nemo's first day of school, he's captured by a scuba diver. Marlin and his new friend Dory set off across the ocean to find Nemo.

There are 3.7 trillion fish in the ocean.
They're looking for one.

Now, We help Marlin to find his son by GBA.

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Finding Nemo



The
They're looking for one.

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There are 3.7 trillion fish in the ocean.
We are looking for one.

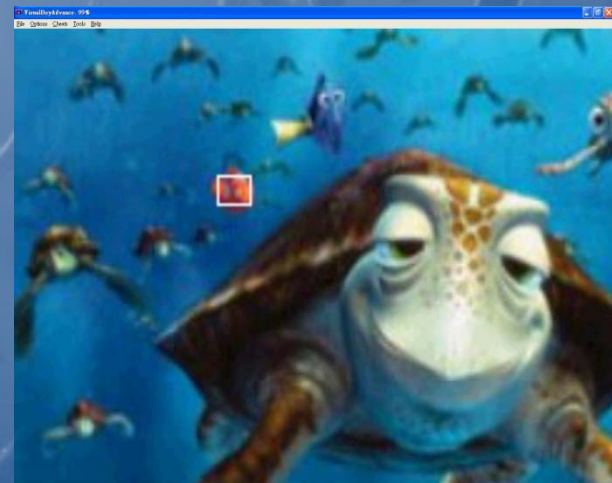


They're looking for one.

Finding Nemo



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How can we find Nemo?

利用電腦視覺演算法 & GBA模擬器平台

1. Color Filter

2. Box Filter

3. Condition Dualization

4. Grouping

5. Histogram

6. Bounding Box

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Color Filter

UInt5 0x7FFF



By Mask 0x001F



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UInt5 0x001F

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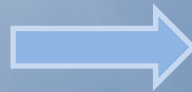
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Color Filter



利用Color filter 可大致把Nemo找出
但仍有許多不必要的雜點如Marlin

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Box Filter



3x3Boxfilter

1	1	1
1	1	1
1	1	1



5x5Boxfilter

1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1

There are 3.7 trillion fish in the ocean.*



7x7Boxfilter



Box Filter

使用越大格數的Box filter

(1)影像越模糊

(2)越能去除雜訊或降低雜訊強度

(3)但程式執行速度越慢

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Project中選擇7x7 Box Filter

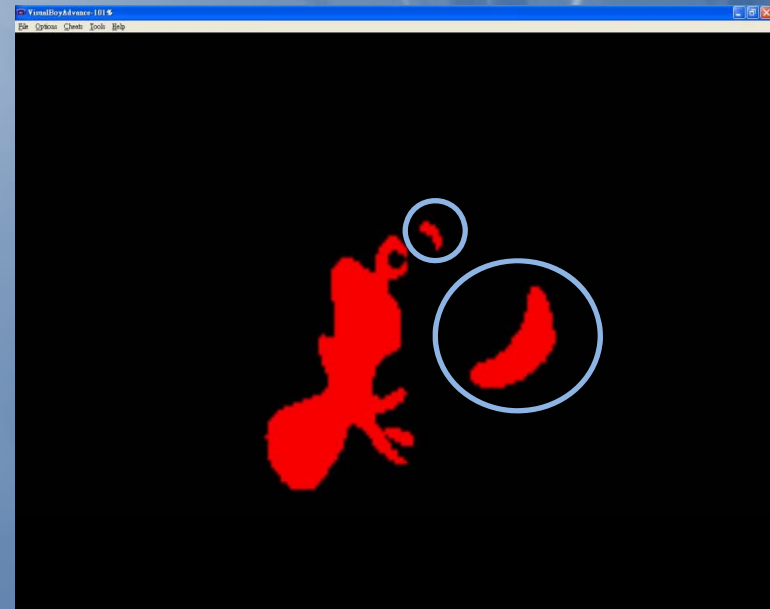
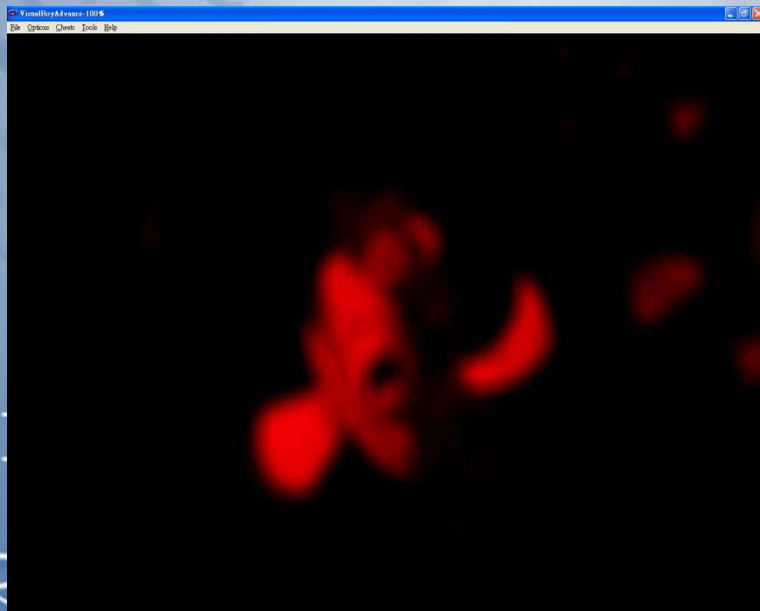
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Dualization(二元化)



取強度中間值15 若pixel強度>15取31,否則取0
模糊化後的影像做二元化後可將雜訊去除
但難免有無法去除的部分

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Sampling



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對無法去除的雜點Sampling
以Matlab軟體分析其RGB值



Sampling and Matlab



Name	Value	Min	Max
Dad	<42x50x3 uint8>	92	233
Dad_B	<42x50 uint8>	92	138
Dad_G	<42x50 uint8>	157	225
Dad_R	<42x50 uint8>	149	233
Nemo	<97x68x3 uint8>	23	253
Nemo_B	<97x68 uint8>	23	93
Nemo_G	<97x68 uint8>	67	129
Nemo_R	<97x68 uint8>	223	253
m5	<160x240x3 uint8>	0	255

Matlab使用Uint8格式
與GBA的Uint5略有不同
Uint8 255 = Uint5 31
Uint8 129 = Uint5 16

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對影像做二元化時同時加入某些條件
提高color filter選色門檻

```
if(G_pixel<16 && R_pixel>15)
```

```
pixel=0x001F;
```

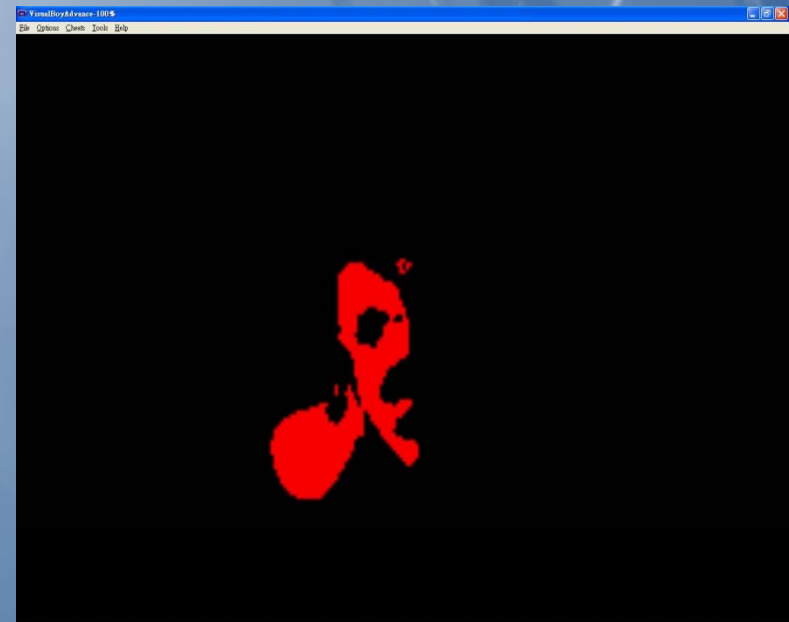
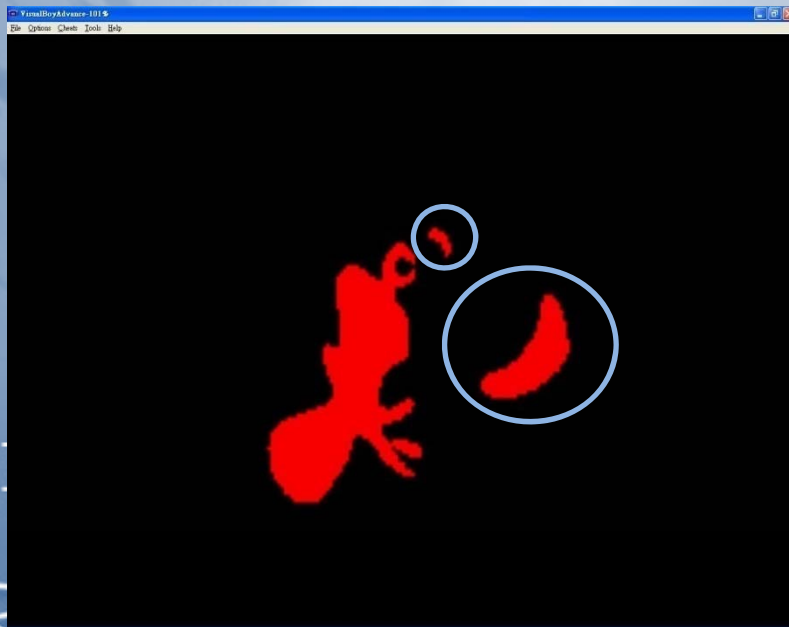
```
else
```

```
pixel=0x0000;
```

	1	2	3	4	5	6	7	8
1	179	194	209	214	214	217	219	220
2	186	200	215	219	219	220	221	221
3	195	209	221	224	223	223	222	220
4	202	213	224	225	223	223	220	217
5	205	214	221	221	220	219	217	213
6	207	214	217	216	216	217	217	214
7	210	215	216	215	214	219	220	219
8	213	217	217	214	215	220	223	223
9	215	214	213	213	214	217	217	220
10	215	216	215	214	215	216	217	219
11	217	218	217	216	215	216	216	217
12	219	219	217	217	215	216	215	215
13	219	219	219	219	217	215	215	215
14	218	219	219	219	218	216	216	214
15	218	219	220	220	219	218	216	215
16	218	219	220	220	219	218	218	215
17	220	220	219	219	219	218	218	218
18	220	220	219	219	219	219	219	219
19	219	219	219	219	220	221	221	222
20	217	218	218	219	220	221	222	223
21	216	216	216	218	220	221	222	223

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Condition Dualization



加入Condition後,成功去除Marlin的魚尾巴
但隨著選色的門檻提高
二元化後設為0x001F的pixel數目減少

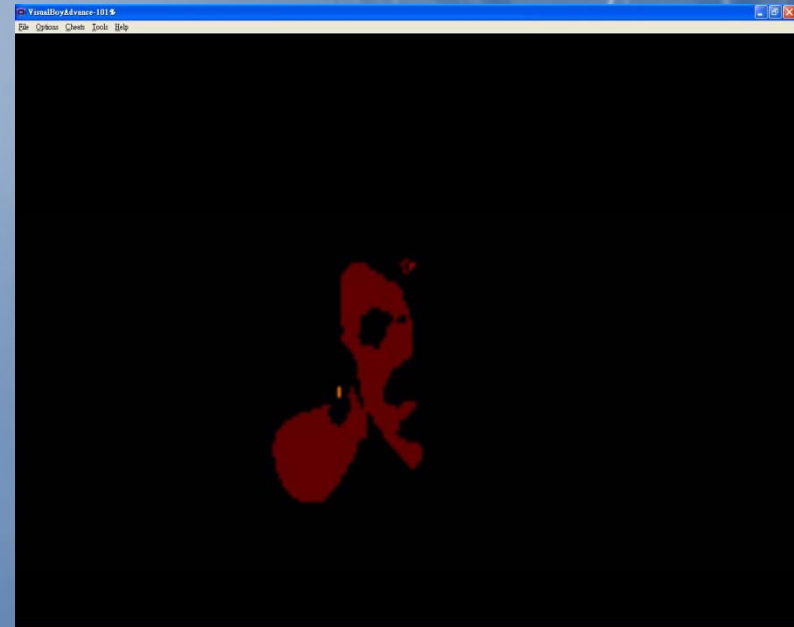
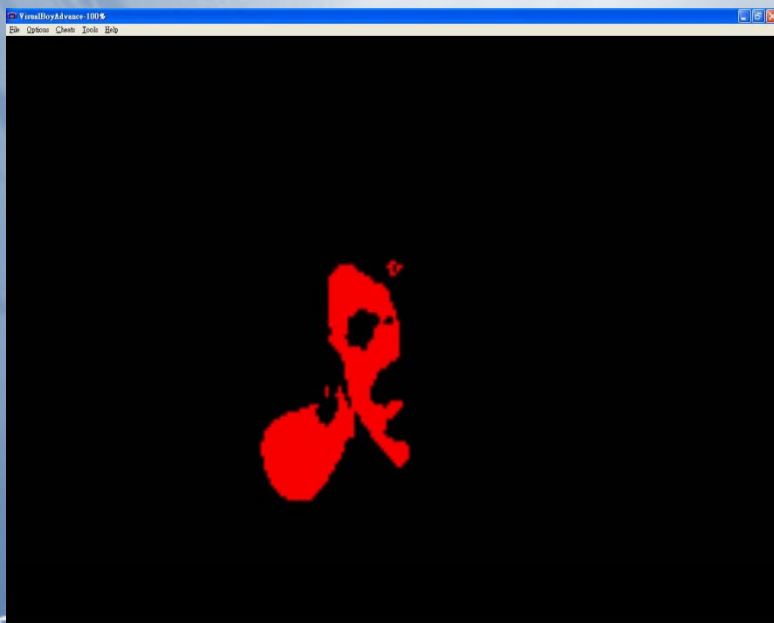
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Grouping

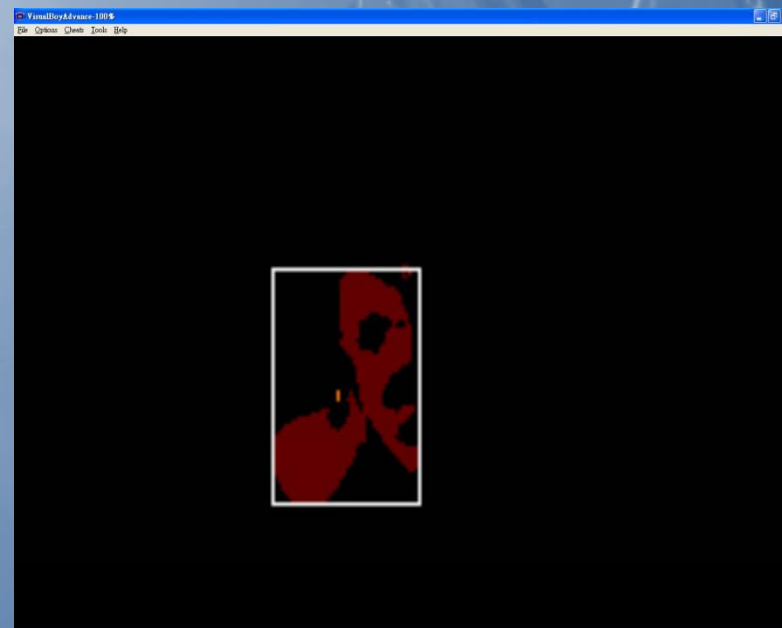
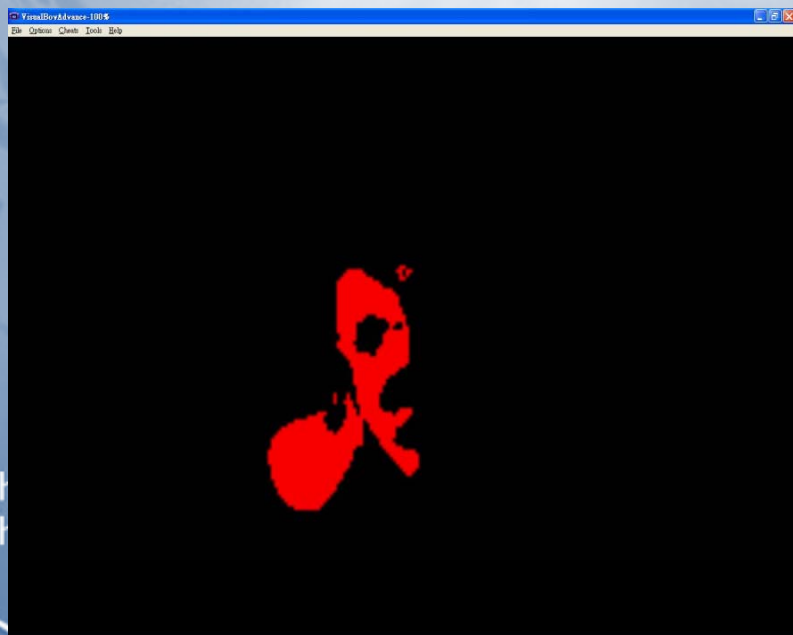


利用Groupig演算法將彼此相連的pixel編為同一群組
以區分不相連的pixel
不同顏色表示不同的群組編號

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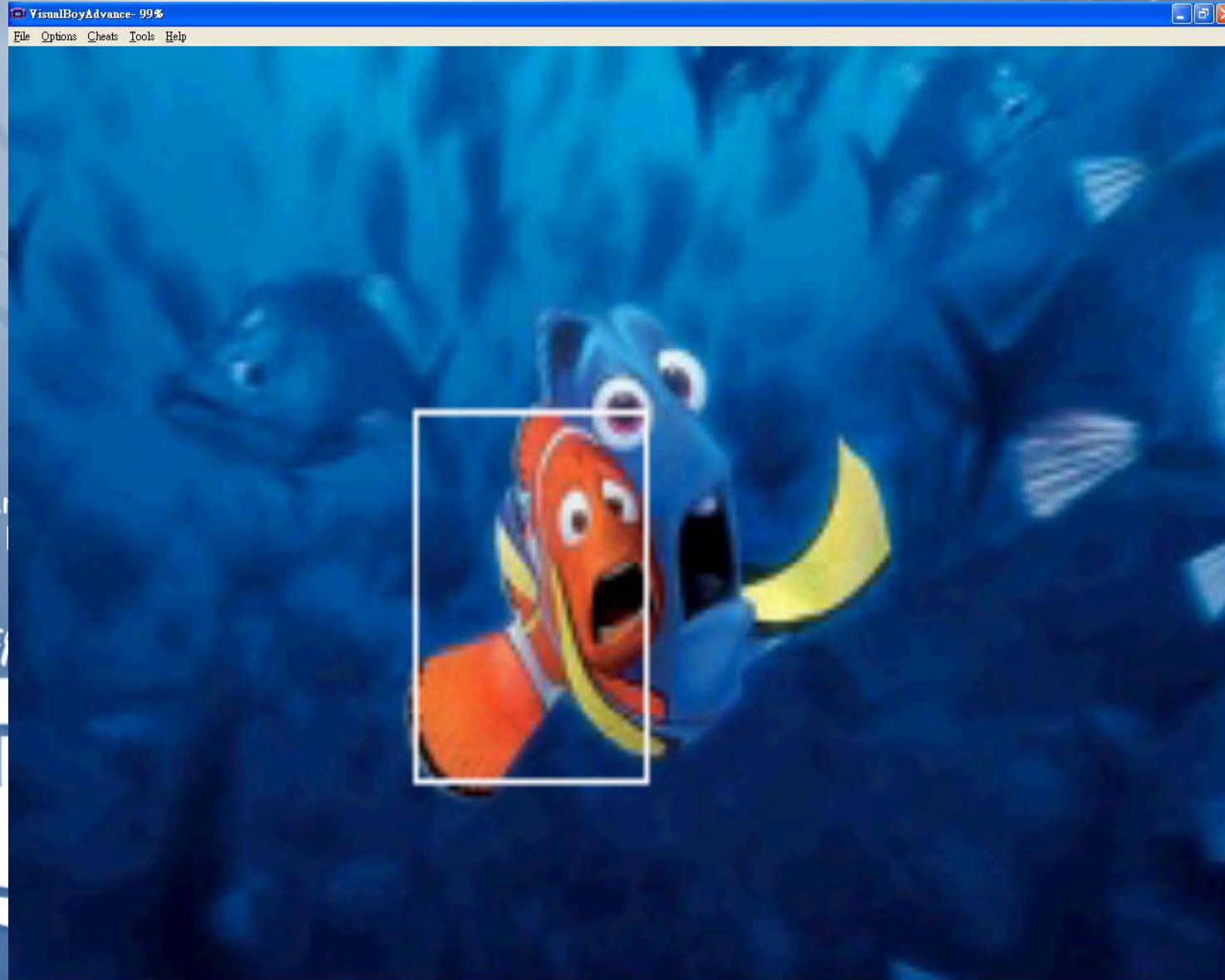
Histogram & Bounding Box

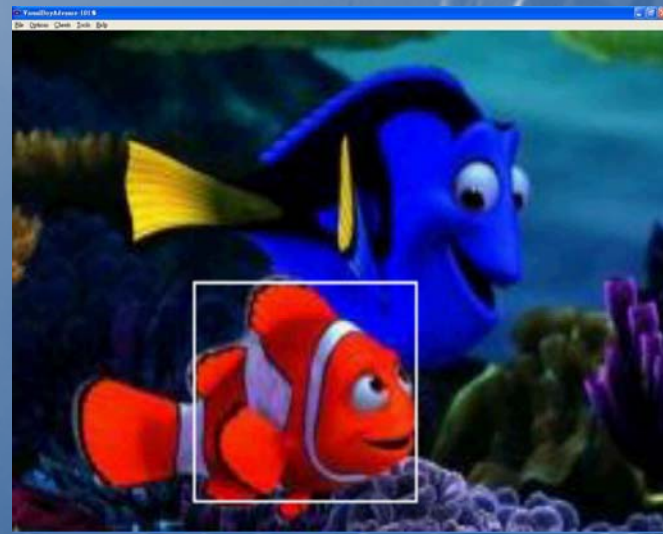
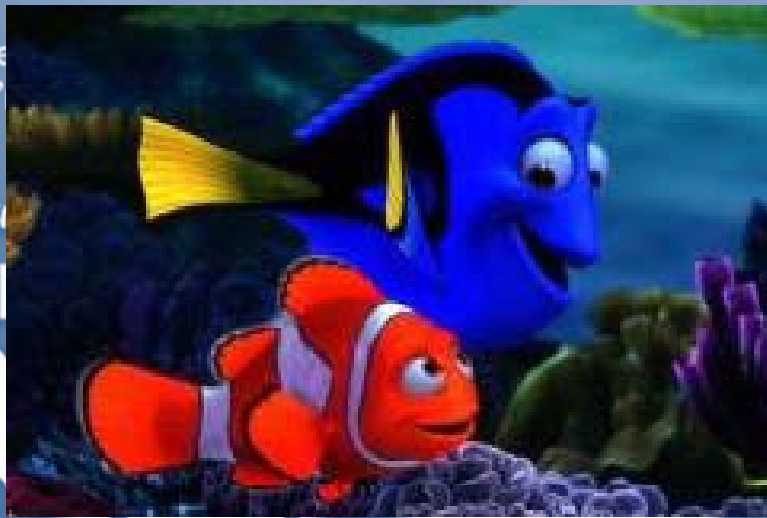


統計Histogram選出最大的群組pixel
再使用Bounding Box演算法畫出可包覆最大群組的最小框

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Finding Nemo





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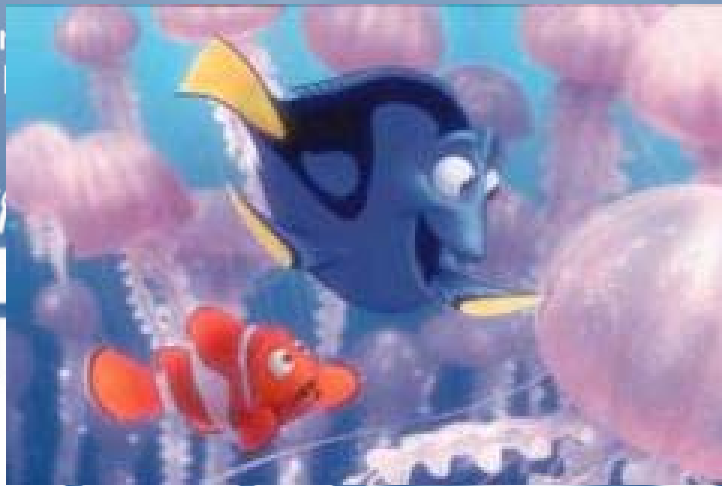
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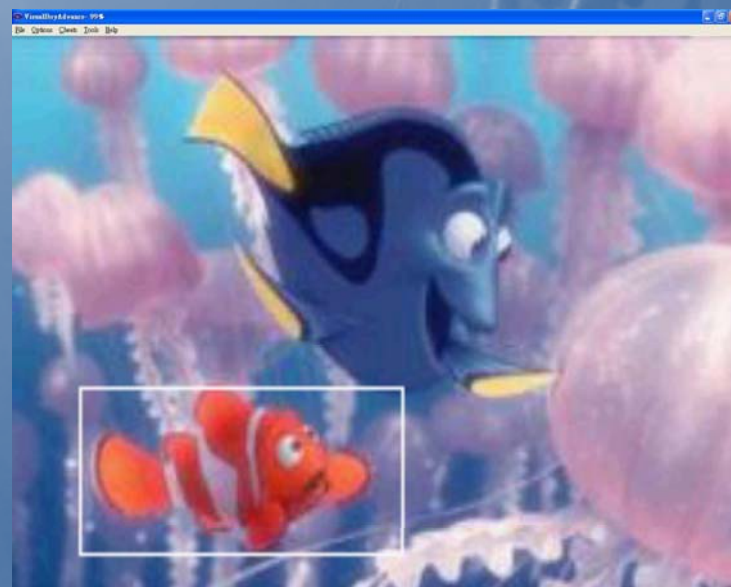
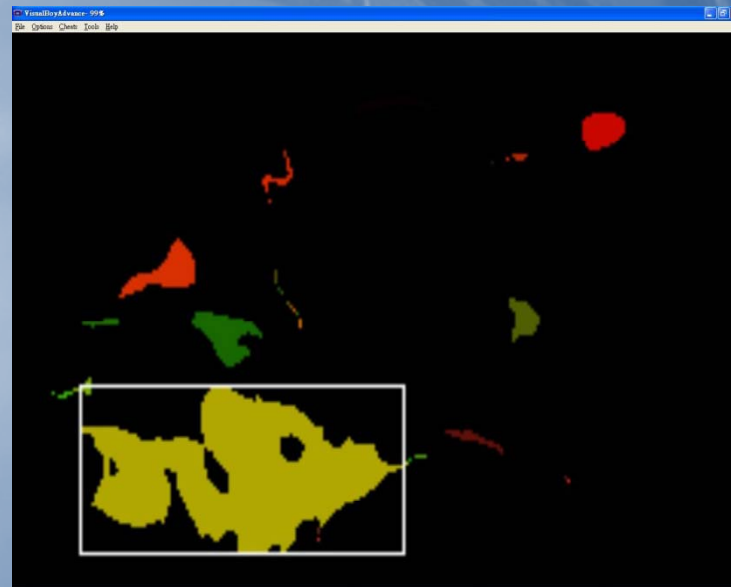
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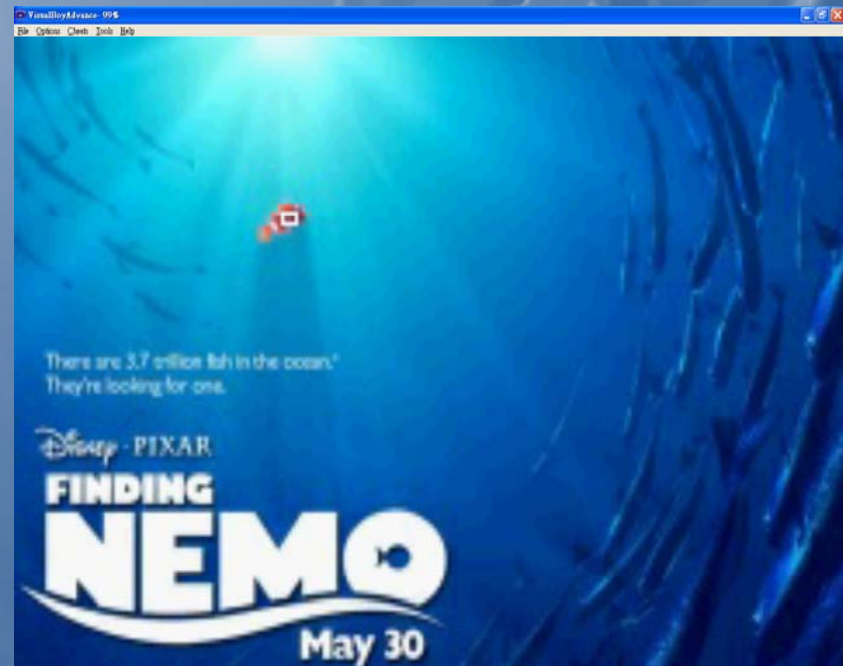
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Reference

Computer and robotic Vision *Robert M. Haralick/Linda G. Shapiro*

數位影像處理 - 運用 MATLAB 繆紹綱



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An underwater scene with a large school of fish swimming in the background. In the center, a small clownfish is visible, looking towards the viewer. Sunlight rays filter down from the top of the frame.

Thanks For Your Attention

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