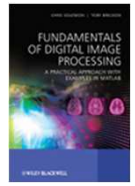
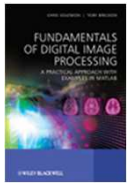


NUI Galway
OÉ Gaillimh

EE551 Embedded Image Processing
Assignment 1

Production Line Visual Inspection


0.5L
0.5L
Coca-Cola



The **Problem**

- **bottling production** line

–Coca-Cola for the Irish domestic market

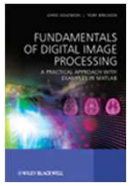
- **images of bottles** leaving facility

–near **constant** factory **lighting conditions** of bottles leaving the bottling line.

- **Requirement** :

–a vision system to **automatically identify different bottling faults** in production

–problems : *filling, labelling and capping*



The **Task**

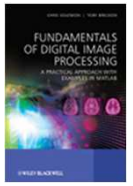
- **Identify** cases of the following :

1. bottle **under-filled** or **not filled** at all
2. bottle **over-filled**
3. bottle has **label missing**
4. bottle has label but **label printing has failed**

–i.e. *label is white*

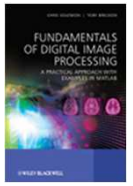
5. bottle **label** is **not straight**
6. bottle **cap** is **missing**
7. **bottle** is **deformed** in some way

–i.e. *squashed*



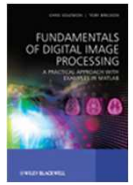
The **Task**

- **Case 1:** bottle **under-filled** or **not filled** at all



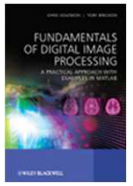
The **Task**

- **Case 2:** bottle **over-filled**



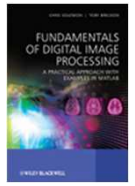
The **Task**

- **Case 3:** bottle has **label missing**



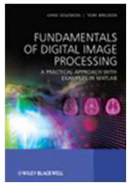
The **Task**

- **Case 4:** bottle has label but **label printing has failed**



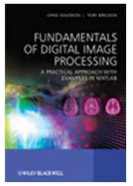
The **Task**

- **Case 5:** bottle **label** is **not straight**



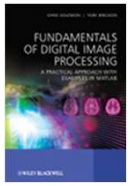
The **Task**

- **Case 6:** bottle **cap** is **missing**



The **Task**

- **Case 7: bottle** is **deformed** in some way



The **Task**

- But **ignore** the following:

–only **interested in** the **centre bottle** in each shot

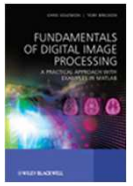
–***missing bottles***

–***faults*** *with* ***side bottles***

•*only the* ***seven faults stated*** *must be* ***reported*** *when they occur with the* ***centre bottle***

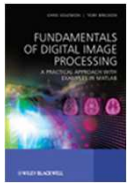
- ***Also :***

–***some bottles may have more than one fault!***



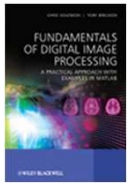
The **Task**

- **Case :** *ignore side faults*



The **Task**

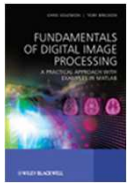
- **Case :** *ignore missing bottles*



The **Task**

- **Case :** *multiple faults*

- *Any correlation between faults should not be relied upon!*



The **data**

- **Full image set :**

–141 images of bottles leaving the bottling facility

- **Labelled data sets (sub-sets of full set) for each case**

–1-7 faults *(single faults)*

–“combination” faults

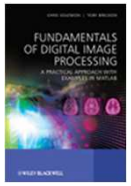
–normal images *(no faults)*

–missing

–side faults

- **Blackboard page :** zip files of data sets + full gallery

»See “Handout” for further details



"Hints"

- ***FIRST* : manually inspect the images**

–Colours, regions, edges

–Do initial development with one or two images and work from there

–Look at things like individual colour dimensions, or even different colour spaces

–Can make some assumptions about the "location" of the bottles ;-)

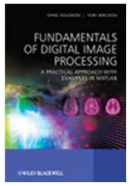
- **Start small – work up**

–"divide and conquer"

–one task, then the next, test then re-test

–start simple : *caps ? / labels ? / bottle - yes/no?*

–Build code "incrementally" – not one big mass of code!



Suggested ***Methodology***

Design *is important -* ***think about the problem****,*
think about the solution*.*

Then ***write code****.*

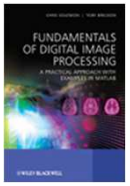
Then ***test****.*

Evaluate*.*

Re-design *if necessary and* ***re-test.***

.....

Follow this cycle.



Good Luck.