Trash Classification

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What’s the goal?

- Automate drone flight to gather pictures.

- Create a program to identify what trash is shown in an image.

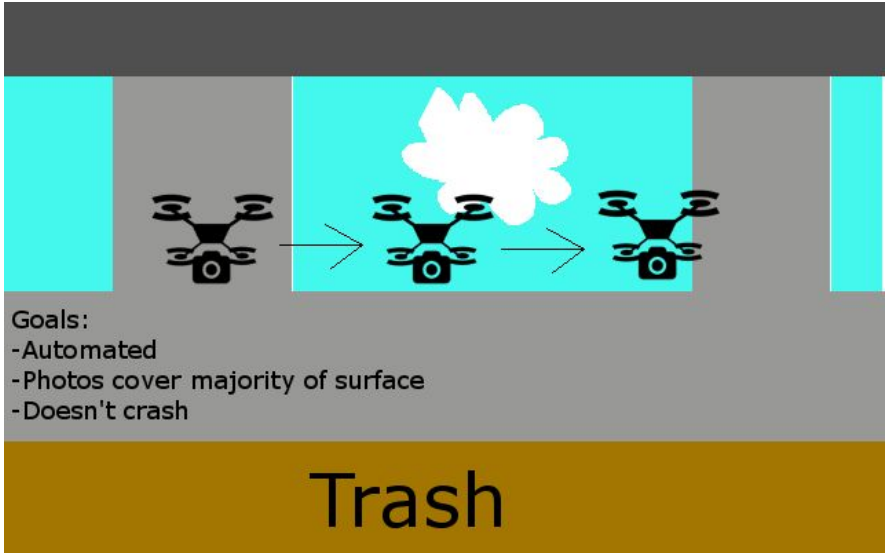
What's the goal?

<u>This Image Contains:</u>

- 40% Cardboard
- 30% Construction Material
- 20% Tree Material
- 10% Household Goods

Drone Flight - How?

- Drone contains PixHawk autopilot hardware.
- The PixHawk will be programmed with Mission Planner navigation software.
- A GoPro will be controlled through the GoPro API to snap pictures as the drone stops in place.
- Pictures taken should cover as much area as they can, without overlap.



Drone Flight - How?

- This is not a dynamic solution.
- The drone will follow a set path that stays within an area, ensuring it avoids walls, pillars, and other obstacles.
- An altitude will be chosen that avoids piled trash, but gets clear images.

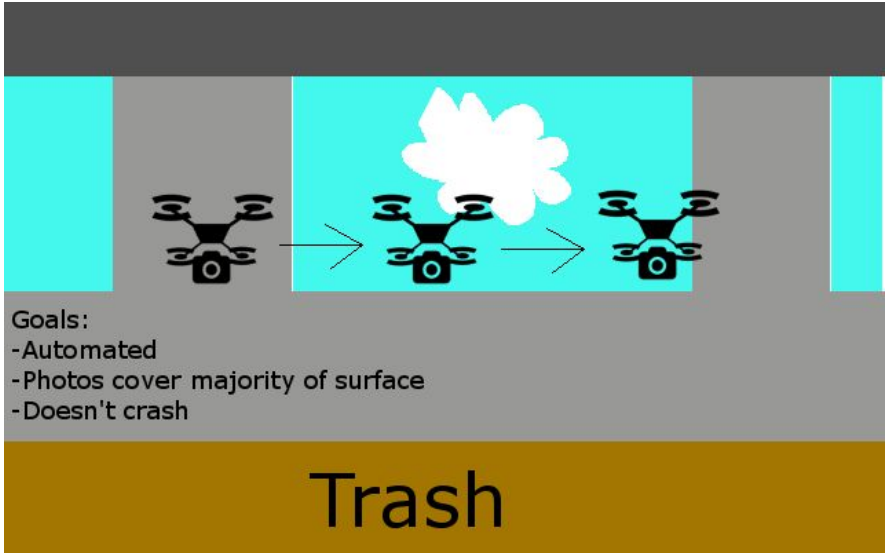


Image Classification - Big Picture

- First we take an image and reduce it to a collection of color histograms, which describe the image.
- With machine learning, a computer can ‘guess’ what the original image will be, based on the histograms of previous images.

Image Classification - Big Picture

- But how do we get from an image, to a collection of histograms?

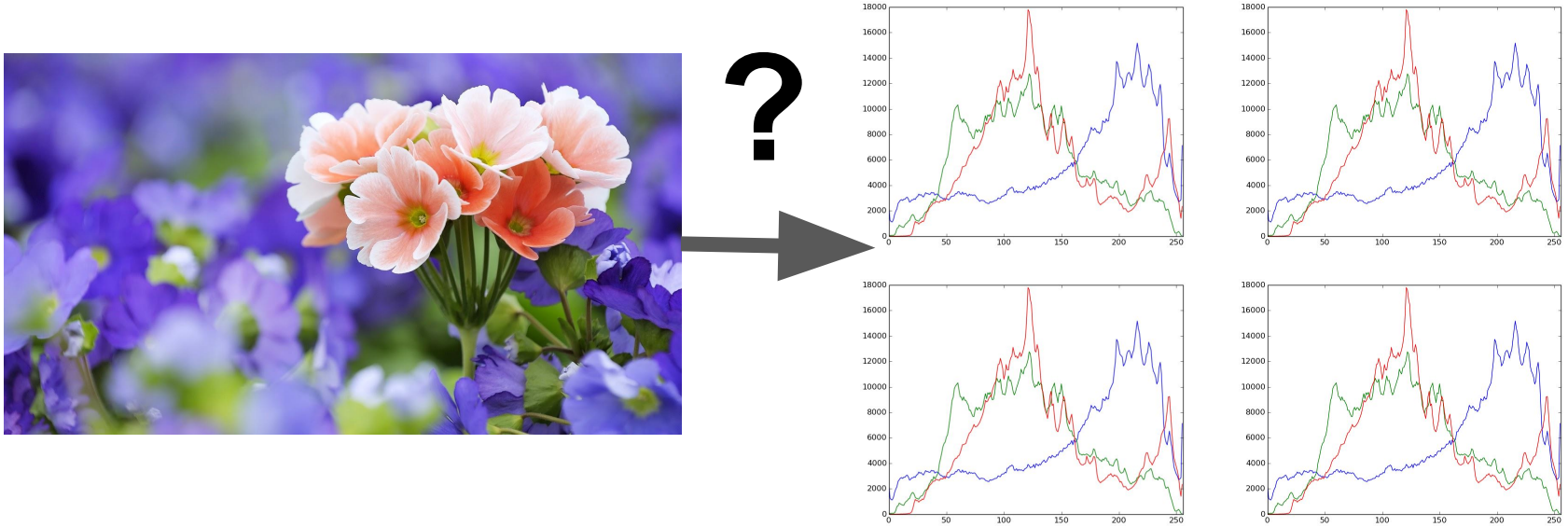


Image Classification - Weak Segmentation

- The goal is to break an image into some rough parts.
- First the image is greyscaled, blurred, and converted into a binary image.

Image Classification - Weak Segmentation

- Then a “Blobbifier” tries to identify segments as best as it can.
- These segments get overlaid the original photo.

Image Classification - Weak Segmentation

- We can then make histograms for each segment.
- These histograms will be used to train the identifier.

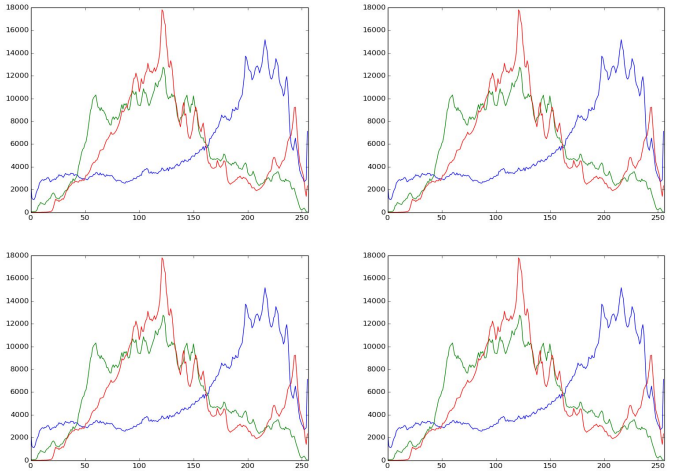


Image Classification - Weak Segmentation

- Here is another example, because I think it looks cool.

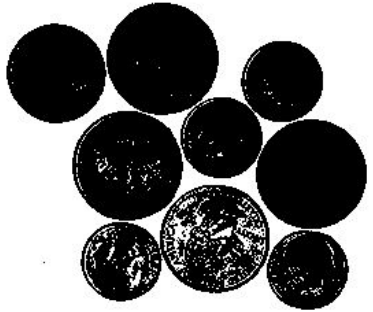
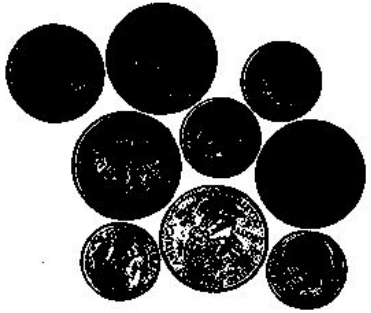
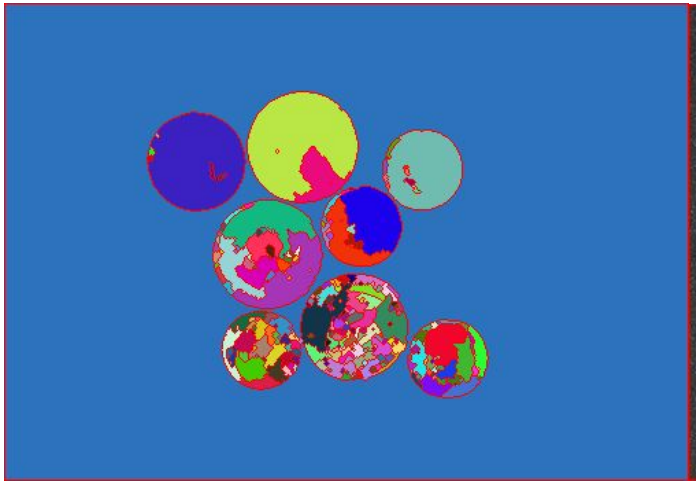


Image Classification - Weak Segmentation





References

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https://en.wikipedia.org/wiki/Otsu's_method

https://en.wikipedia.org/wiki/Connected-component_labeling