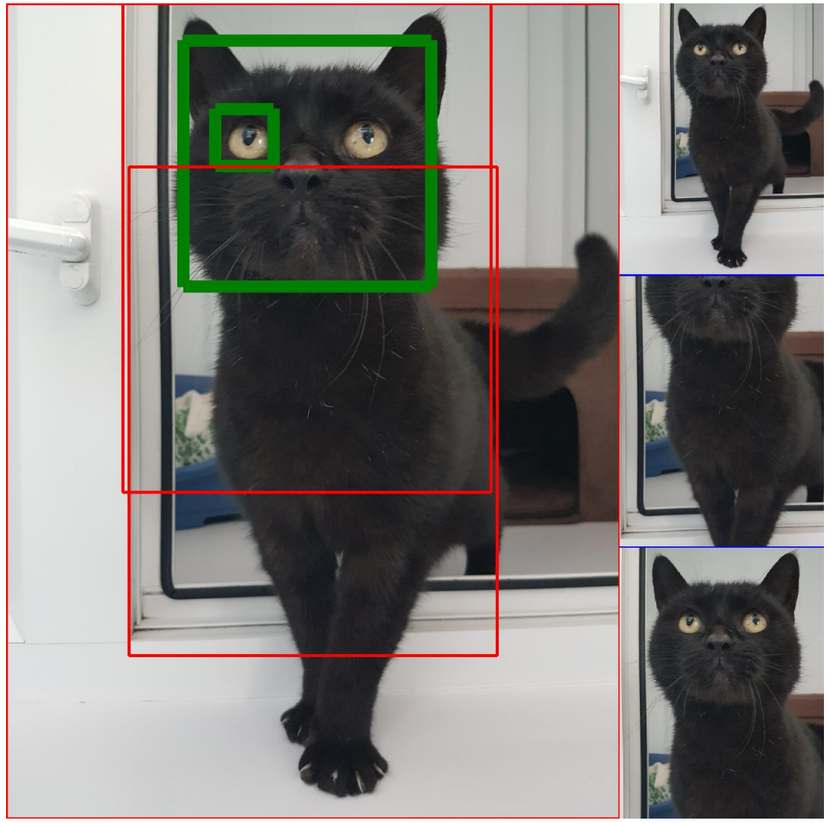
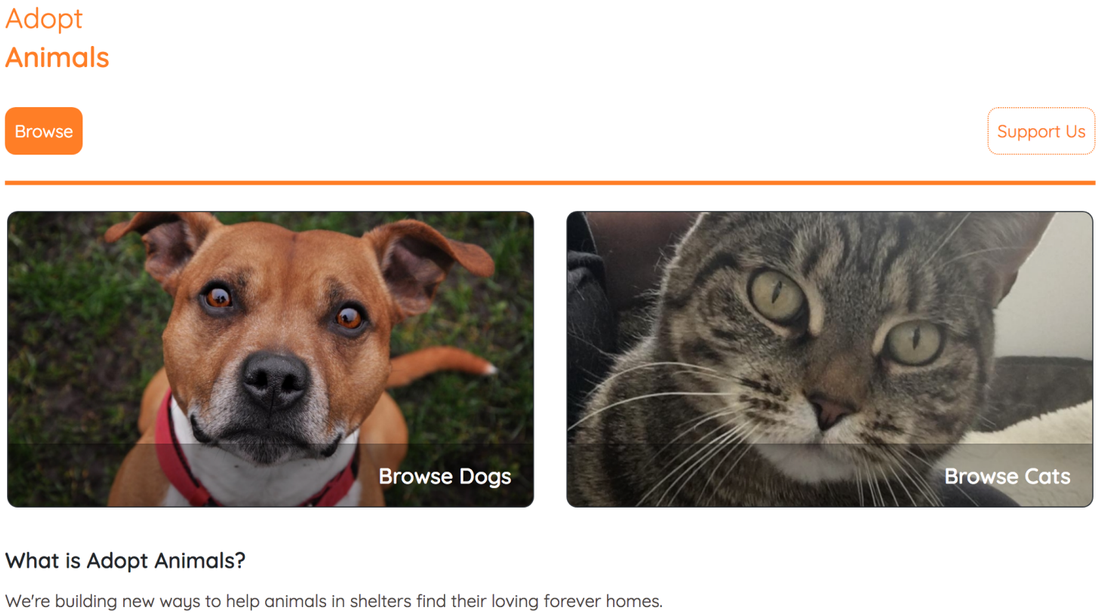
Whiskers, Ears and Puppy Dog Tails: finding out what animal pictures are made of



Who am I? Why am I doing this?

-  Mike Moran, Engineer at Skyscanner
- Adopt Animals
- Skyscanner “One Day”
- A general Machine Learning interest

Context: Adopt Animals



— Adopt Animals, by Kale charity

What were we trying to do?

"Often, the images that we get are going to be slightly off-centre w.r.t. the subject, which makes the smaller previews look odd - I'll frame my thoughts as questions then statements:

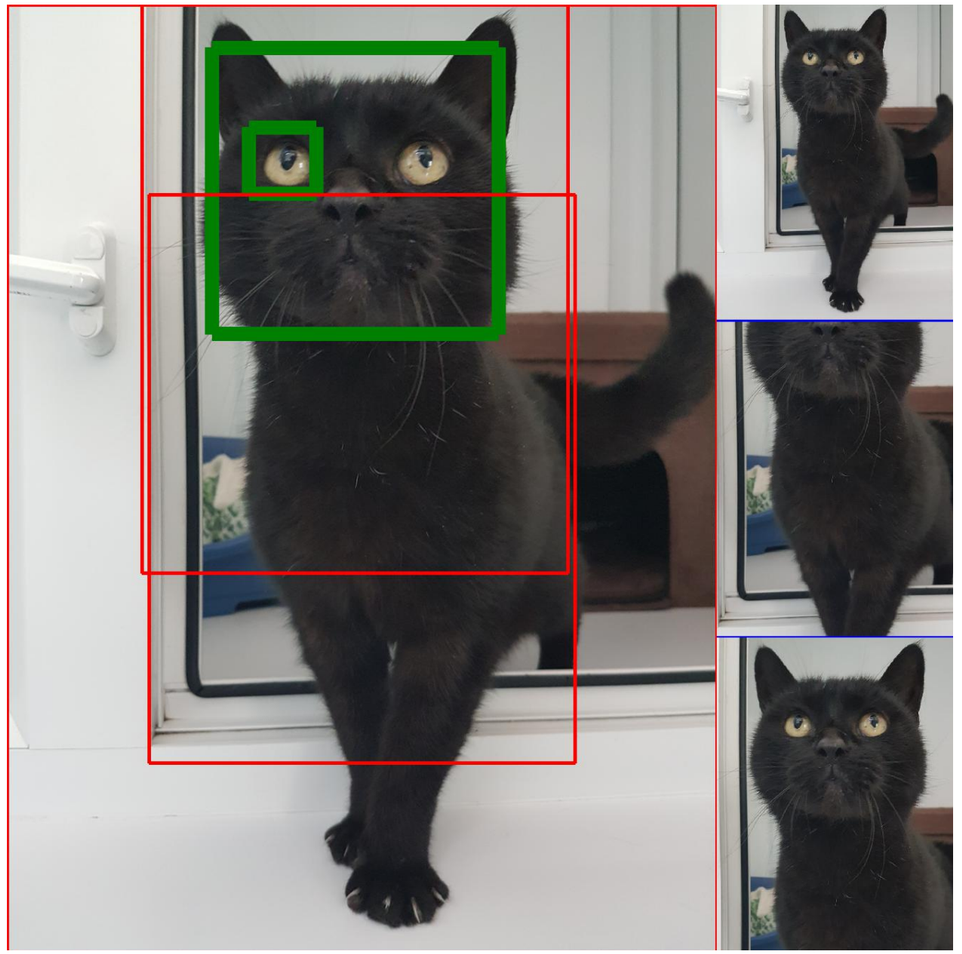
- Do ML models exist that can find the rough position of an animal's face?
- Is it per species (I'm guessing so)?
- How do I run it as part of an aggregation workflow? And what's the computational cost? Would it run on a small-ish Droplet?
- I don't need any "internal" details mapped, just where their face is, as a bounding box or something
- It doesn't have to be super perfect - more for nudging the frame in the right direction
- I can get a bunch of reference material, in the form of some snapshots of EDCH images over whatever time frame you'd like
- I can't promise to ship it immediately but it sounds like a fun side-project at least 🙂"

— (Sky of Adopt Animals)

My constraints

- I ~~am lazy~~ have limited time, so an off-the-shelf solution would be good
- I am *not* a Jupyter expert (yet?)
- I have a non-uniform experience of Data-science algorithms

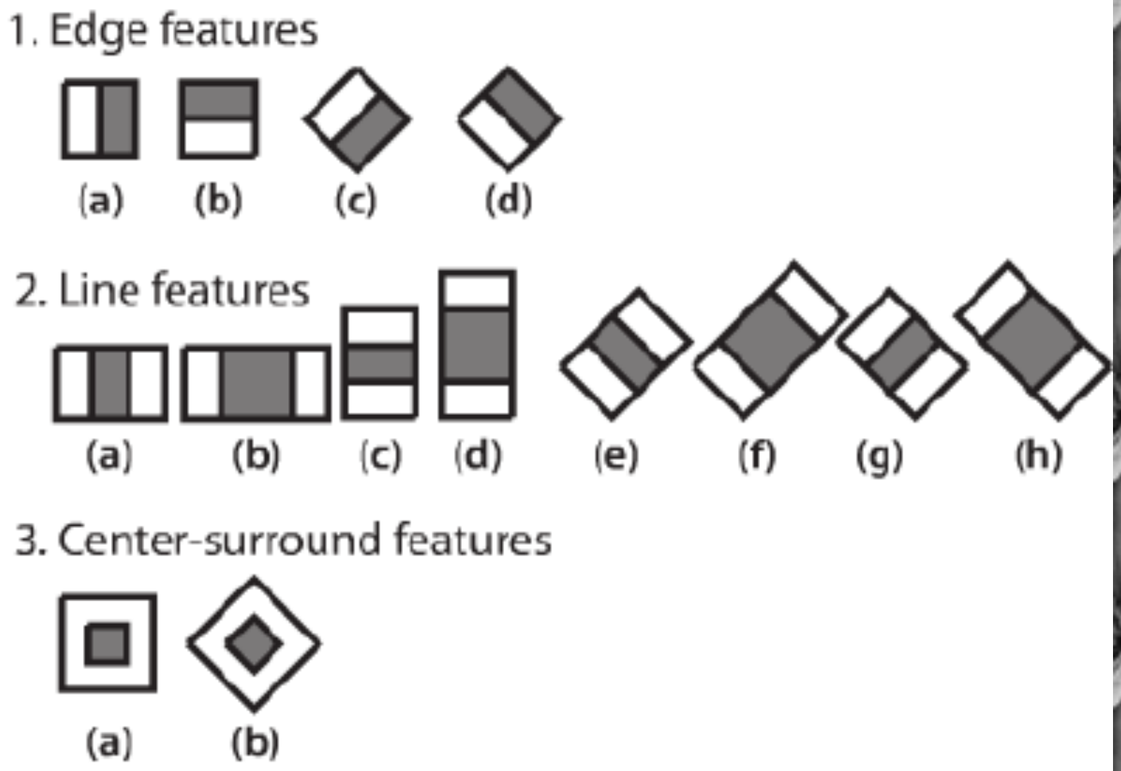
Ok, so how do I get to this?

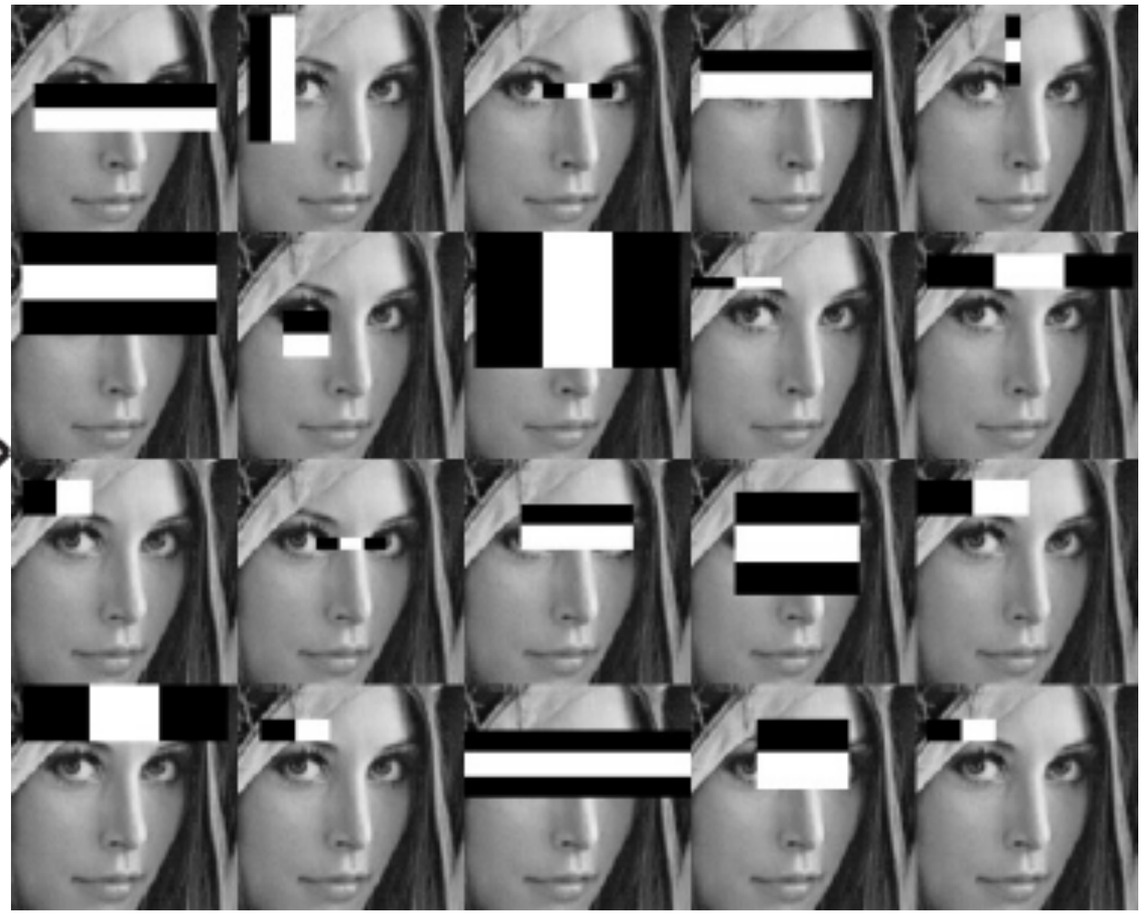


Going with something I know: Viola Jones face detection

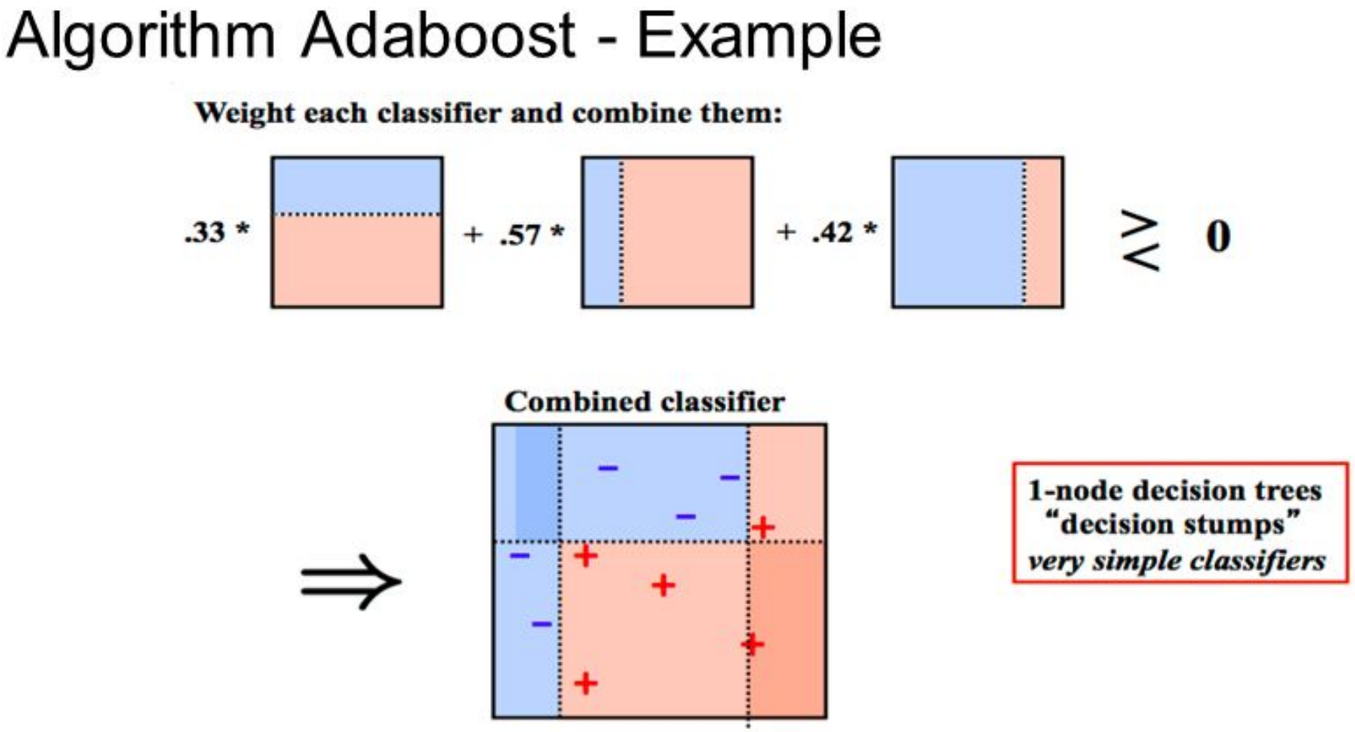
— from “Looking for Bobby but found Paris instead”

Training: Haar features





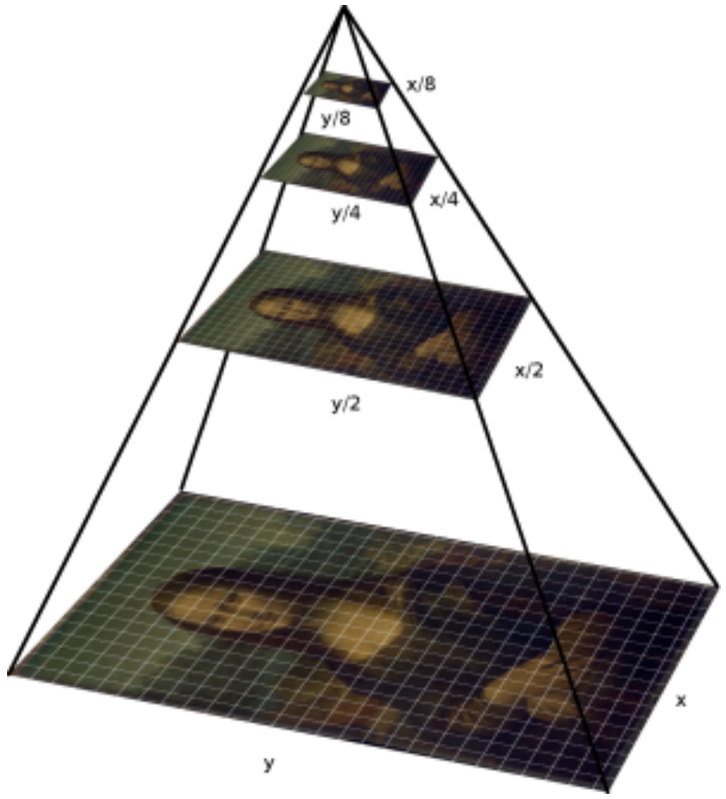
Training: Adaboost



courtesy to Alexander Ihler http://sli.ics.uci.edu/Classes/2012F-273a?action=download&upname=10-ensembles.pdf

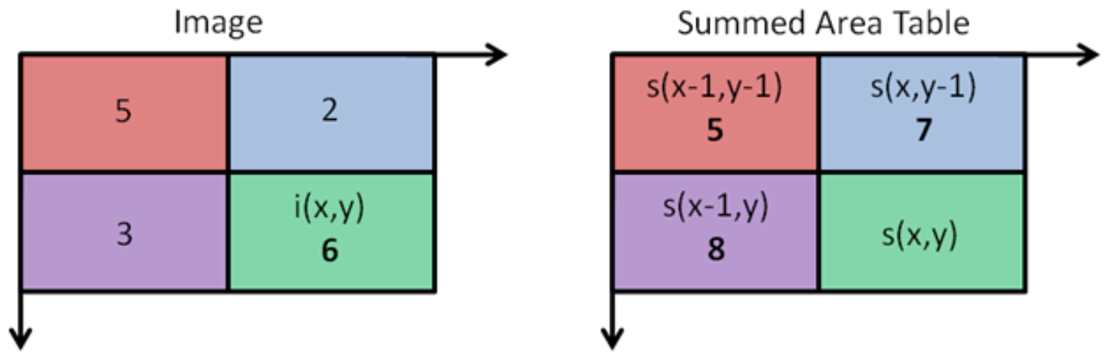
Applying: Image Pyramid

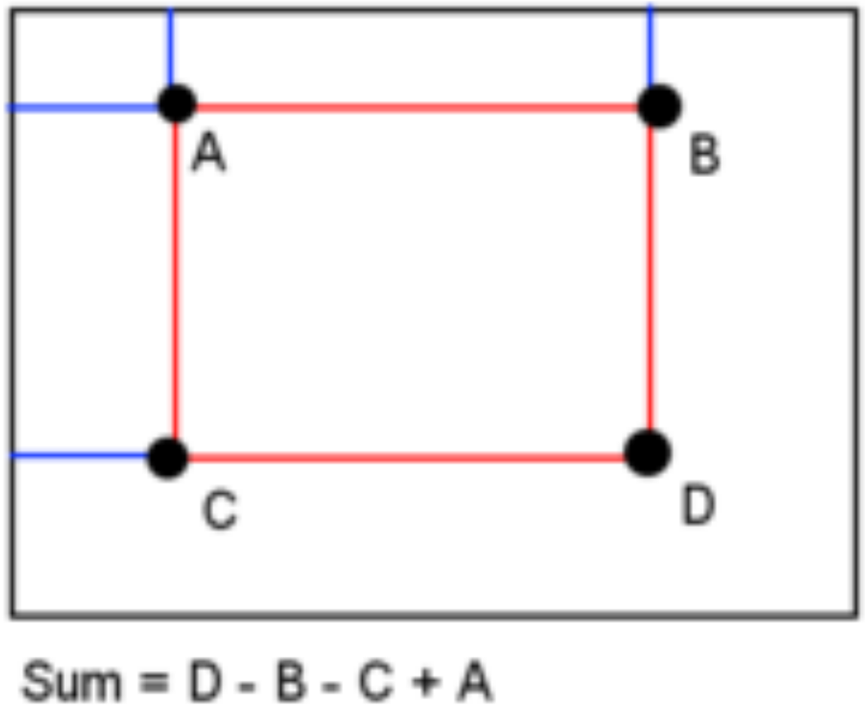
- deals with varying feature size



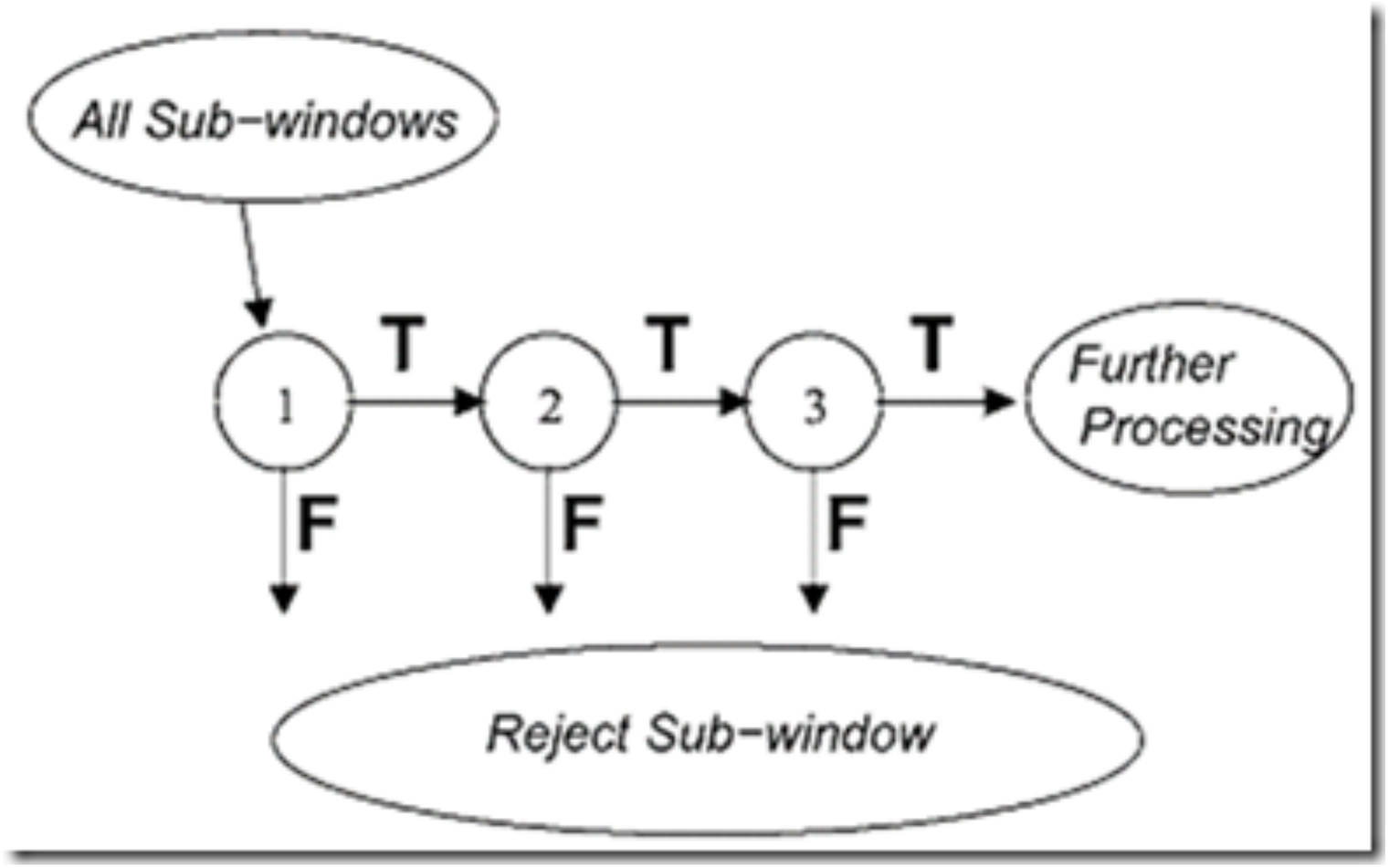
Applying: Integral Image

- efficiently evaluates hear features; $O(n^2)$ ➡ $O(1)$





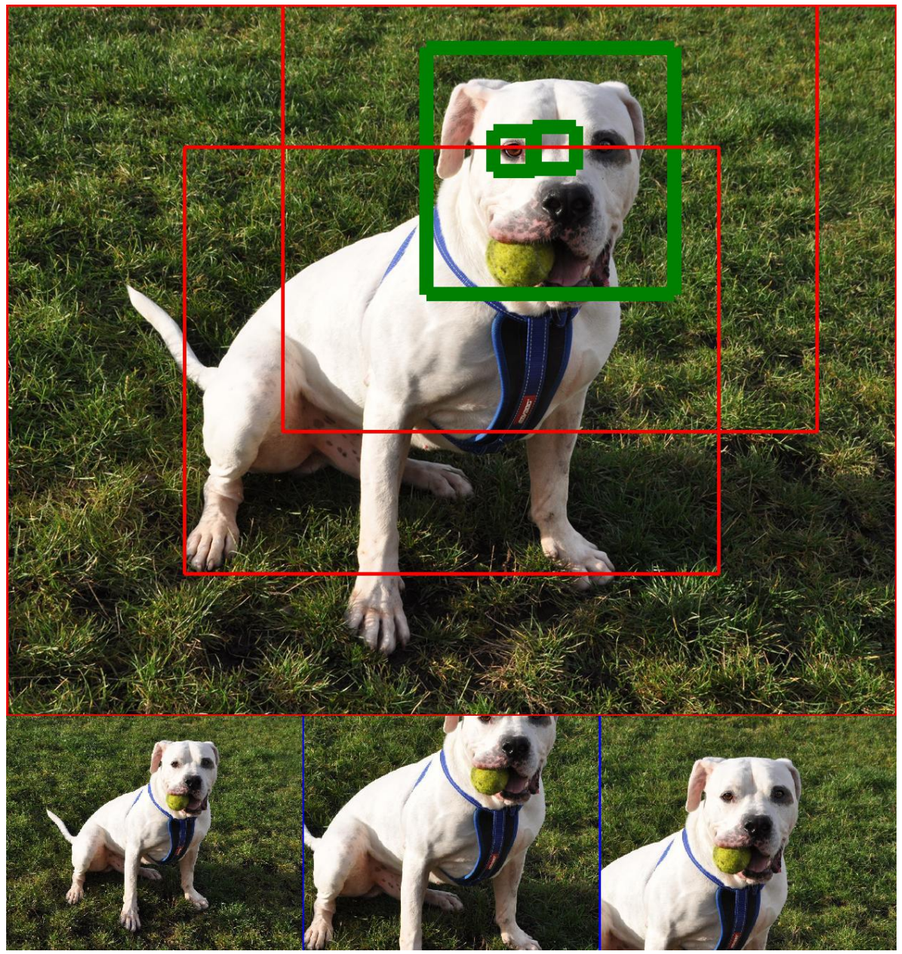
Applying: Haar cascade

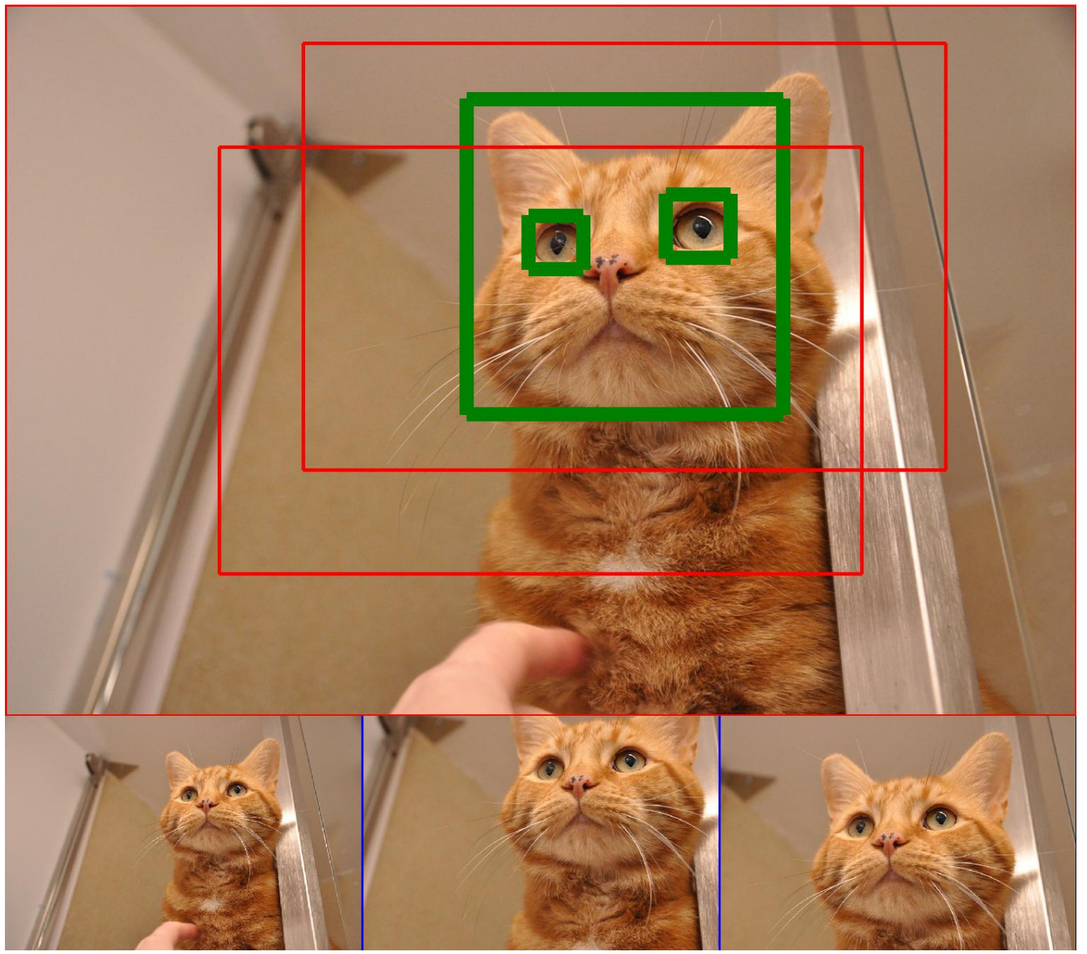


Visualising applying to image

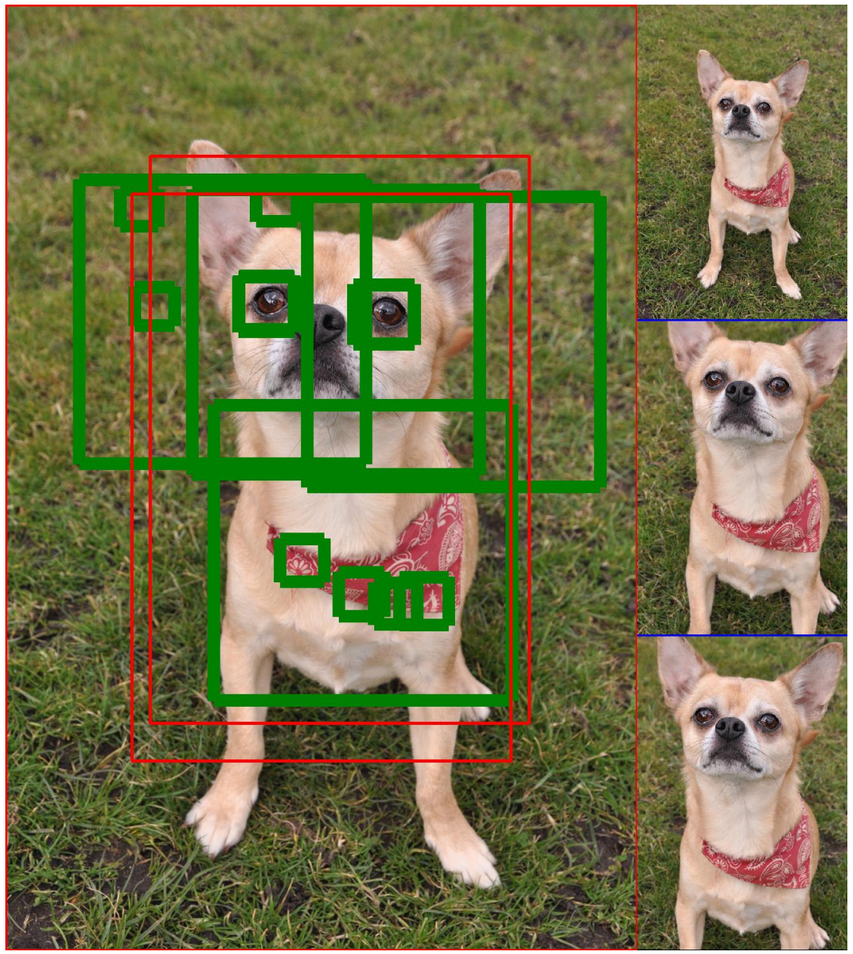
YouTube visualisation by Adam Harvey

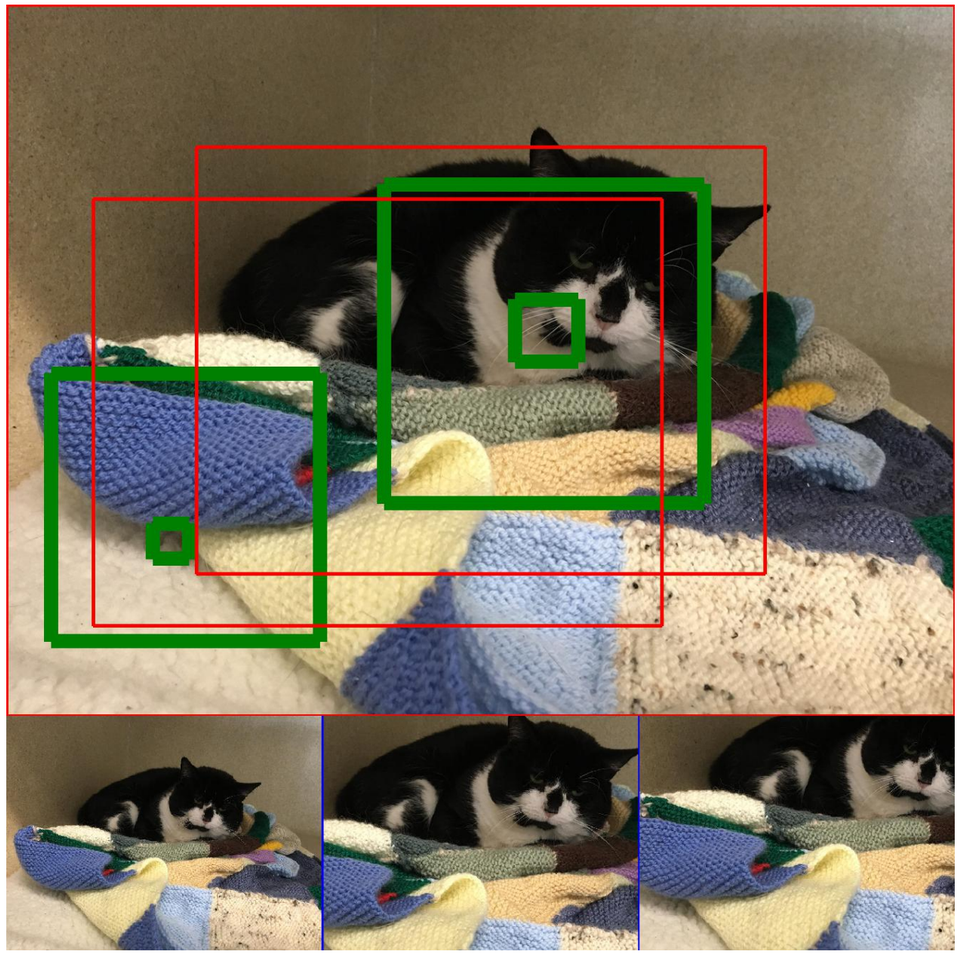
Where have I gotten to in this? Job done, ye?





Not so fast





Visualising varying min_size

Learnings / Reinforcements

- Maybe *too* lazy in not focussing on understanding e.g. playing with scale-size instead of max-size parameters. Became clear once I actually spent some time on it.
- Some parameters still seem like magic (min neighbours = 5)
- You don't have to be an expert to be helpful

Backing up: what next?

- Productionising the cats-only thumbnails
- Pre-learned Dogs?
- Auto-learning of parameters on top of same algorithm
- #HASHTAG DEEP LEARNING?
  - Deep learning is expensive, both in terms of cpu cost and collecting of training data, is it worth it?

Thanks / Contact details / Questions

Sky of Adopt Animals, https://twitter.com/carrotcodes

KALE CHARITY

Kale charity, https://www.kale.org.uk/

(that's me), https://twitter.com/mike_moran