Face detection went mainstream in the early 2000's when Paul Viola and Michael Jones invented a way to detect faces that was fast enough to run on cheap cameras. However, much more reliable solutions exist now. We’re going to use a method invented in 2005 called Histogram of Oriented Gradients — or just **HOG** for short.

To find faces in an image, making our image **black and white** because we don’t need color data to find faces:

algorithm called face landmark estimation. There are lots of ways to do this, but we are going to use the approach [invented in 2014 by Vahid Kazemi and Josephine Sullivan.](http://www.csc.kth.se/~vahidk/papers/KazemiCVPR14.pdf)

The basic idea is we will come up with 68 specific points (called landmarks) that exist on every face — the top of the chin, the outside edge of each eye, the inner edge of each eyebrow, etc. Then we will train a machine learning algorithm to be able to find these 68 specific points on any face: