- Deep computer vision
  - -> self driving cars
  - -> these use a tensor flow deep learning model
  - -> for medicine, sports, for images of players moving on the field
  - -> content
    - -> convolutional neural networks
    - -> image data vs regular data
    - -> convolutional layers and pooling layers
    - -> convolutional bases
    - -> cnn architectures
    - -> using pre-trained models to perform classification tasks
- ***Image data***
  - -> images have a width and a height
  - -> they also have colour channels
  - -> there are three dimensions for images -> three arrays, one for r, g and one for b
  - -> each image has three layers -> it's a stack of these pixels
- ***Dense vs convolutional neural networks***
  - -> if we were to reflect the image of a cat then it wouldn't be able to tell it was still an eye
    - -> convolutional neural networks can tell the different features of the cat and find them in different areas of the images in future
    - -> vs dense neural networks -> which just learn those patterns in specific areas
  - **-> convolutional neural networks can find features of the cat wherever it is on the image**
    - -> dense classifiers
    - -> dense neural networks work on a global scale
  - -> ***regular neural networks***
    - -> these e.g find the eyes of a dog
    - -> in the training image
    - -> if you use a regular neural network then it starts looking for the feature of the animal in the same locaion on the image where they were found in the training image
      - -> but those features have moved in the training image
      - -> output feature maps <- the presence of specific features/ filters
  - ***-> dense neural networks***
    - -> these output feature maps
    - -> run filters over the image
    - -> run an output feature map
    - -> we are running these feature maps which are searching for features in the image -> e.g the presence of paws or eyes in the image
      - -> **the layers of each of these maps which look for different features in the images are called feature maps -> this is how convolutional layers work**
      - -> then if paws and eyes are in an image -> it might be a cat
      - -> using stacks of these layers
      - -> pooling is also used
      - -> quantifying the presence of the filter
      - -> this is location independent on the image
    - -> dense neural networks analyse input on a global scale and recognise patterns in specific areas
      - -> vs convolutional neural networks, which scan through the entire input a little at a time and learn local patterns (rather than global)