

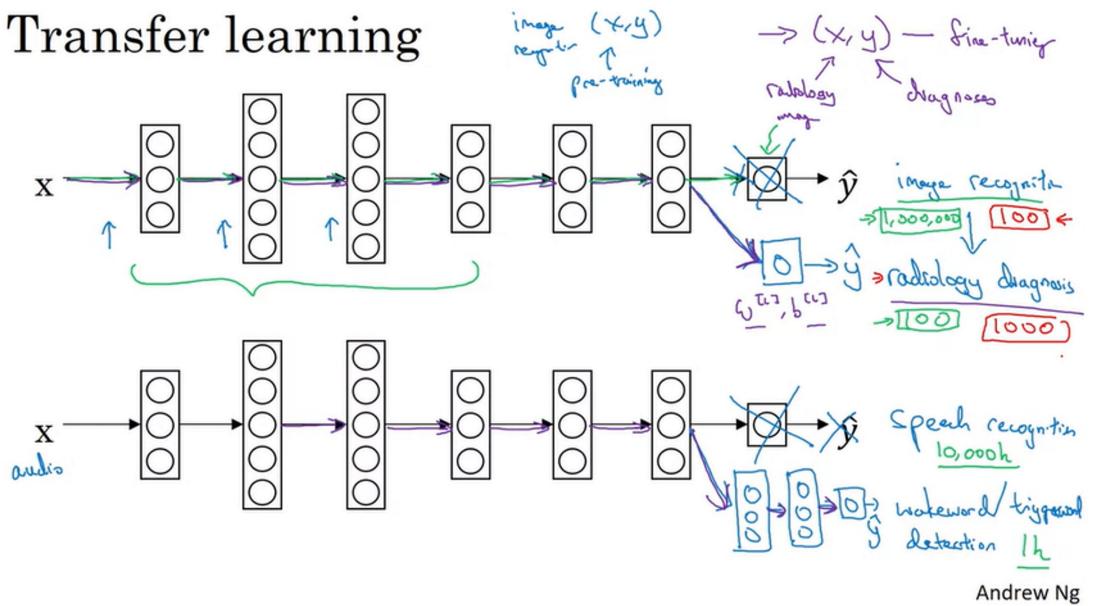
Learning from multiple tasks

Tuesday, September 1, 2020 9:24 PM

① Transfer learning

- Using knowledge gained from one task and transfer it to another task
eg: image recognition → radiology
 - ↓
pre-training
 - ↓
fine-tuning
- Usually used when we have lot of data for the problem we are transferring from and relatively less for the problem we are transferring to.
(The opposite does not work)
- Helps model to apply already learnt low level features to the new problem

Transfer learning



Andrew Ng

- It makes sense when

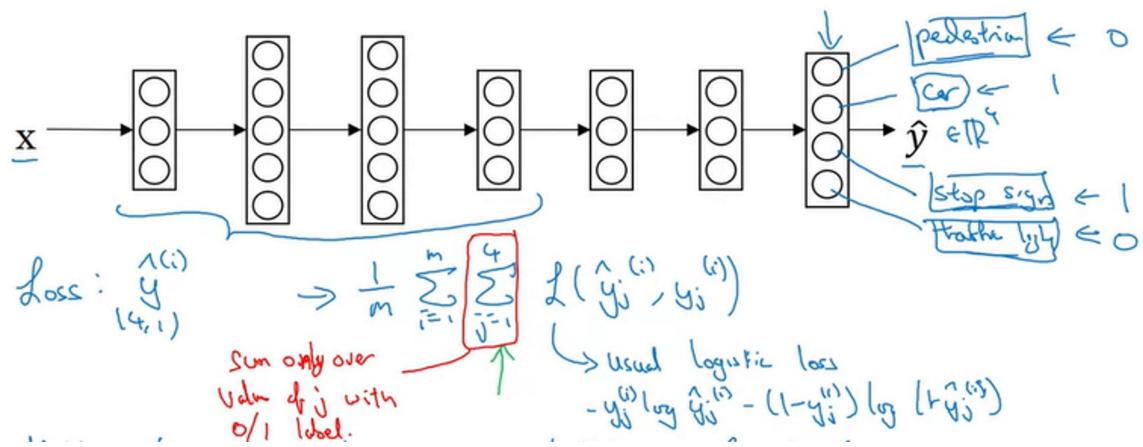
- Task A & B have the same input x .
- You have a lot of data for Task A than Task B.
- Low level features from A could be helpful for B

② Multi-task learning

- use same model for multiple tasks
- Outputs more than one value

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- Outputs more than one value
- Different from softmax regression because one image can have multiple labels
- e.g.: In autonomous driving,
some model can be used to recognise pedestrian, car, stop signs and traffic lights
- These tasks can benefit from sharing low level features

Neural network architecture



- Works even with incomplete input data (use only complete data for calculating loss)
- It makes sense when
 - Training on a set of tasks that could benefit from having shared low level features
 - Usually the amount of data you have for each task is quite similar
 - Can train a big enough neural network to do well on all the tasks
- Used much less than transfer learning

$$\text{Multi-task learning} \leftarrow Y = \begin{bmatrix} 1 & 1 & ? \\ 0 & 0 & ? \\ ? & ? & ? \\ ? & ? & ? \\ 0 & 0 & ? \end{bmatrix} \leftarrow$$