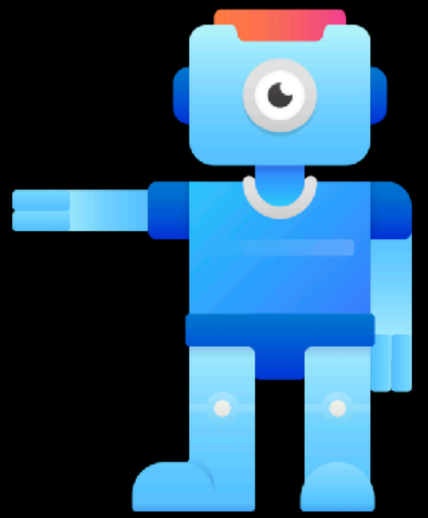

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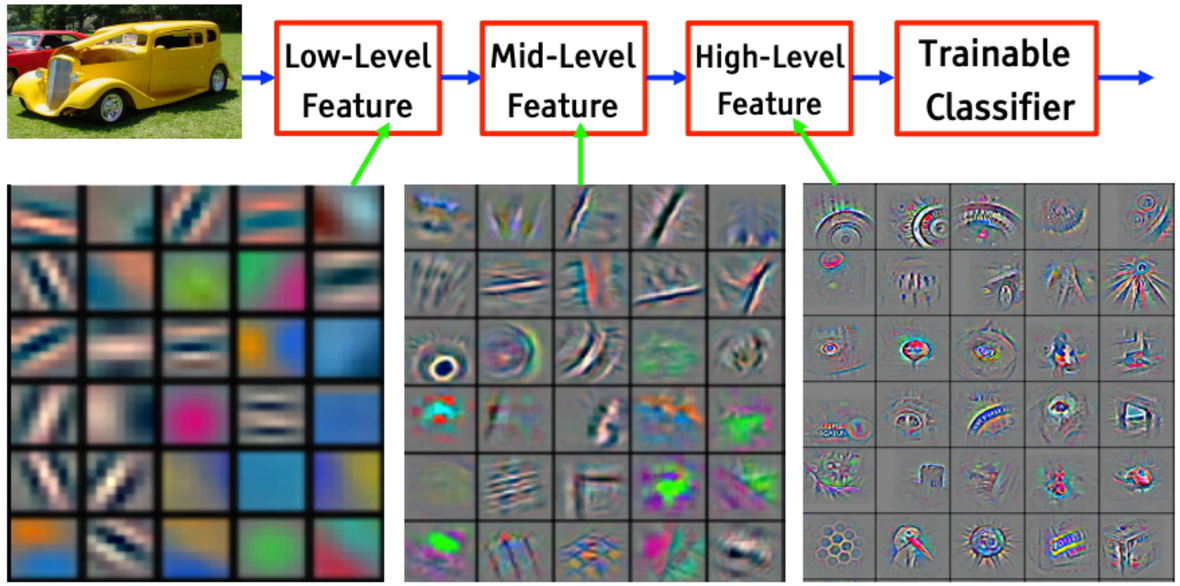
How to Train a CNN

We now explore a high level view of how the training process works

What Conv Filters Learn

- Typically early layers of our CNN learn **low level** features (like edges, or lines)
- Mid-level layers learn **simple patterns**
- High-level layers learn more **structured complex patterns**
- **How is this done?**

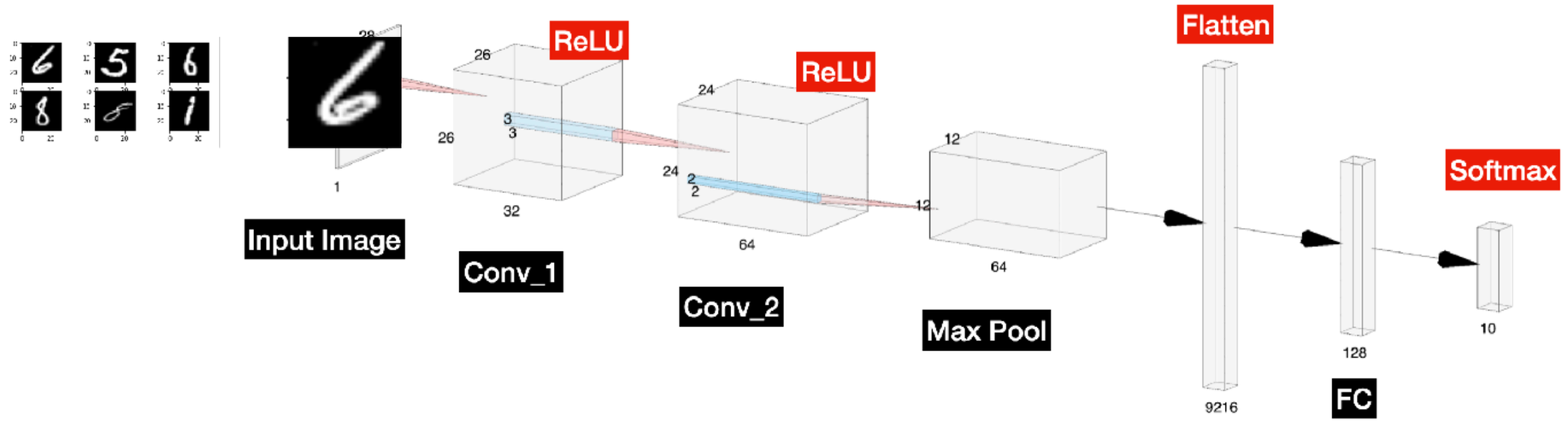


http://www.iro.umontreal.ca/~bengioy/talks/DL-Tutorial-NIPS2015.pdf

What Happens During Training?

- **Initialise random weights** values for our trainable parameters
- **Forward propagate** an image or batch of images through our network
- Calculate the **total error**
- Use **Back Propagation** to update our gradients (weights) via Gradient Descent
- **Propagate more images** (or batch) and update weights, until all images have been propagated (one epoch)
- **Repeat a few more epochs** (i.e. passing all image batches through our Network) until our loss reaches satisfactory values

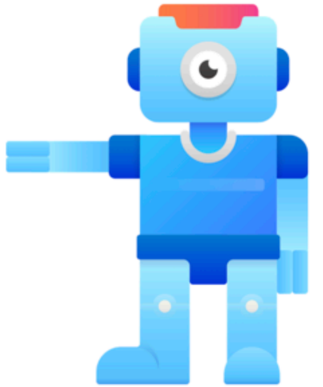
The Training Process



P	6	5	6	8	8	1
0	**0**	0.9	0.83	0.21	0.19	0.62
1	**0.73**	0.8	0.89	0.7	0.92	0.07
2	**0.78**	0.88	0.19	0.39	0.08	0.74
3	**0.37**	0.56	0.07	0.64	0.64	0.9
4	**0.63**	0.25	0.79	0.94	0.52	0.55
5	**0.87**	0.65	0.57	0.63	0.97	0.04
6	**0.67**	0.05	0.45	0.51	0.87	0.51
7	**0.71**	0.66	0.13	0.59	0.86	0.89
8	**0.51**	0.88	0.59	0.01	0.37	0.63
9	**0.24**	0.52	0.79	0.15	0.63	0.78

We need to Learn from our Results

- How correct are our results?
- We need a way tell the model it needs to do better



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Next...

Loss Functions