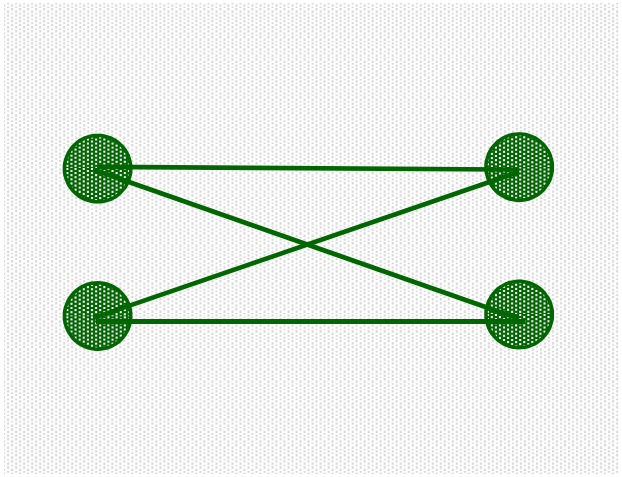
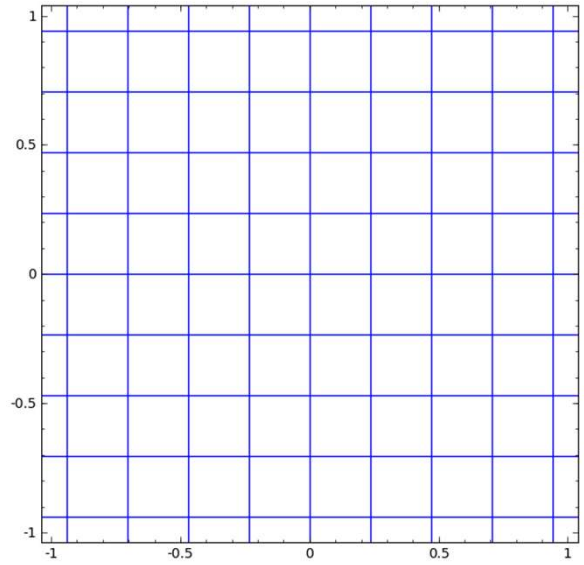
Linear Transformation in Neural Networks

- Fully-connected layers (linear layer)



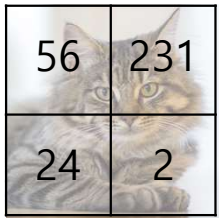
$\mathbf{x} \xrightarrow[T_1]{} \mathbf{y}$

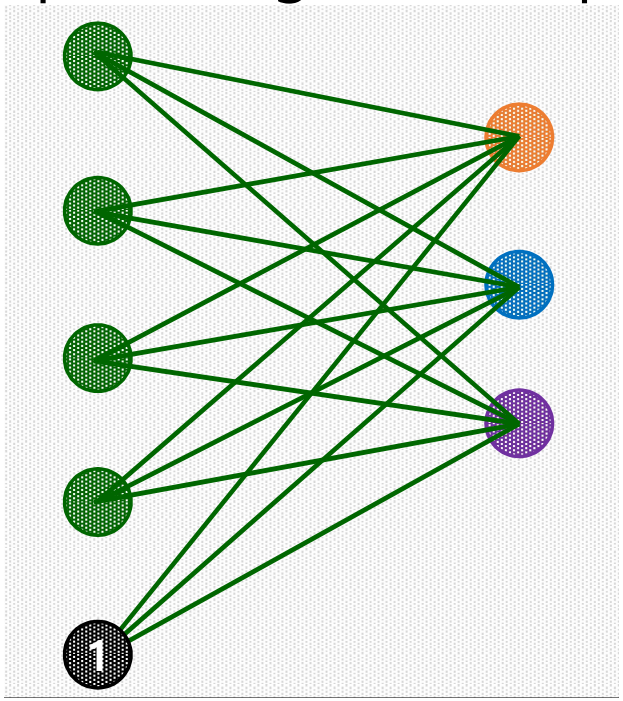


https://colah.github.io/posts/2014-03-NN-Manifolds-Topology/

Affine Layer in Neural Networks

- Fully-connected layers usually involve a bias term. That is why we call it an affine layer, but not a linear layer.
- Example: Image with 4 pixels and 3 classes (cat/dog/ship)





0.2	-0.5	0.1	2	56	+	1.1	=	-96.8
1.5	1.3	2.1	1	231		3.2		439.9
-.2	0.3	0.7	-1.3	24		-1.2		71.1
				2				

=56	0.2	+231	-0.5	+24	0.1	+2	2	+1	1.1
	1.5		1.3		2.1		1		3.2
	-.2		0.3		0.7		-1.3		-1.2

=	0.2	-0.5	0.1	2	1.1	56
	1.5	1.3	2.1	1	3.2	231
	-.2	0.3	0.7	-1.3	-1.2	24
						2
						1