

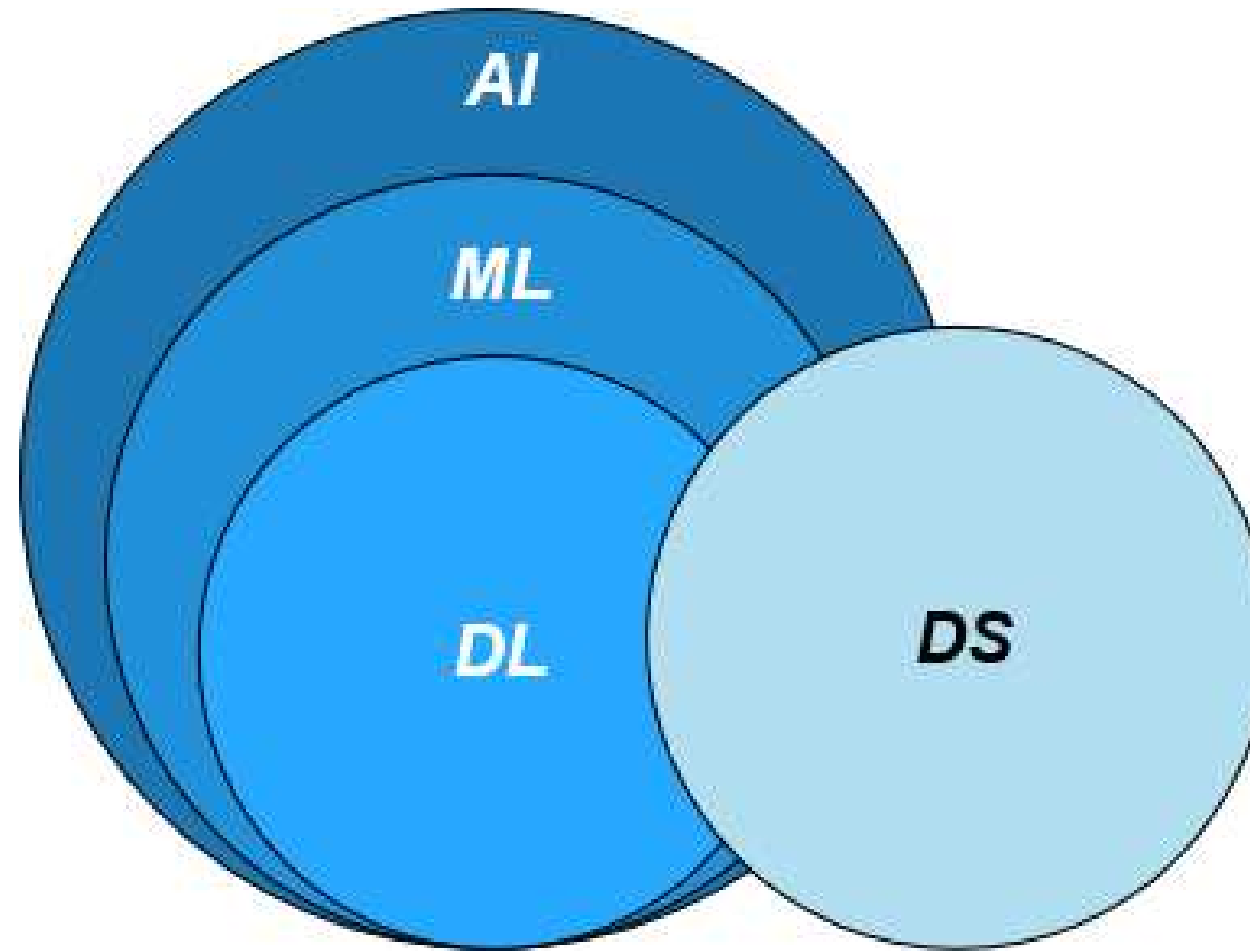
The background features a dark gray field filled with intricate, interconnected wireframe structures. These structures are composed of thin lines forming various polygonal shapes, creating a complex, mesh-like appearance. The colors of these wireframes include shades of pink, white, light blue, and purple, which are distributed across the frame. A prominent white wireframe shape, resembling a stylized letter 'P' or a similar abstract form, is centered in the background. Overlaid on this is a semi-transparent gray rectangular box containing the text.

Neural Networks & Deep learning course

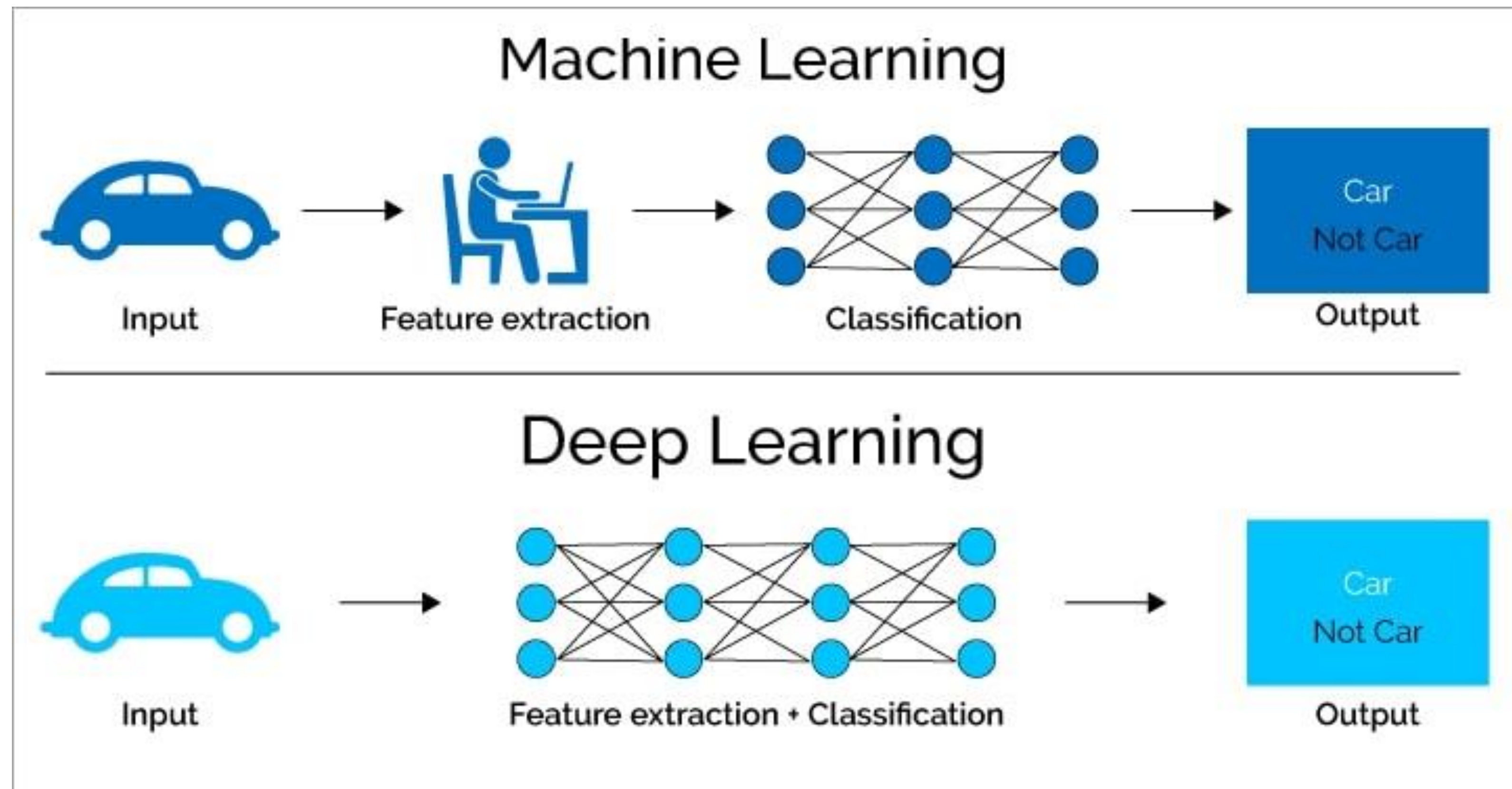
What is “deep learning”?

1. **Neural nets:** A class of machine learning architectures that use stacks of linear transformations interleaved with pointwise nonlinearities
2. **Differentiable programming:** A programming paradigm where parameterize parts of the program and let gradient-based optimization tune the parameters

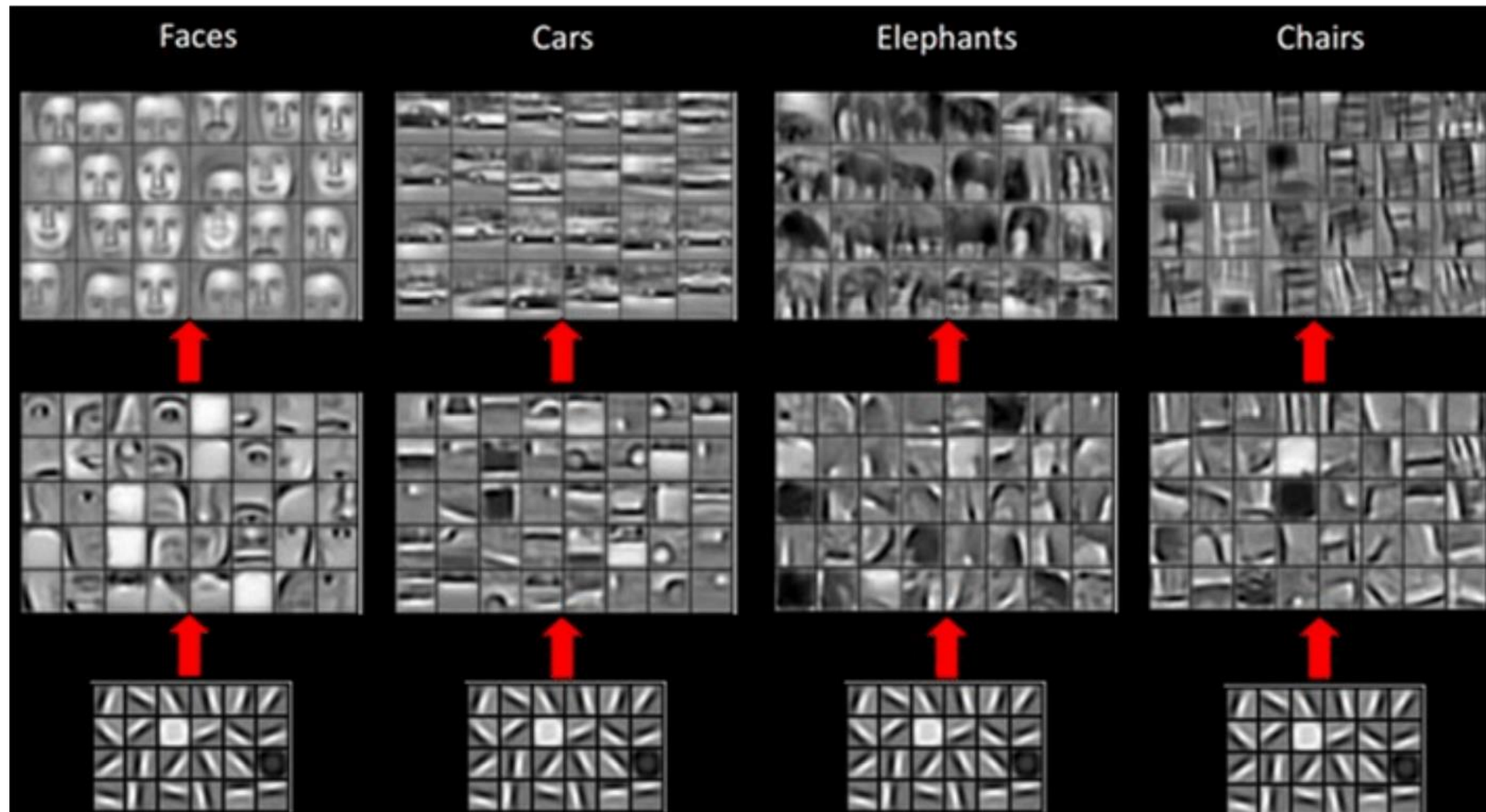
Connection of deep learning with other areas



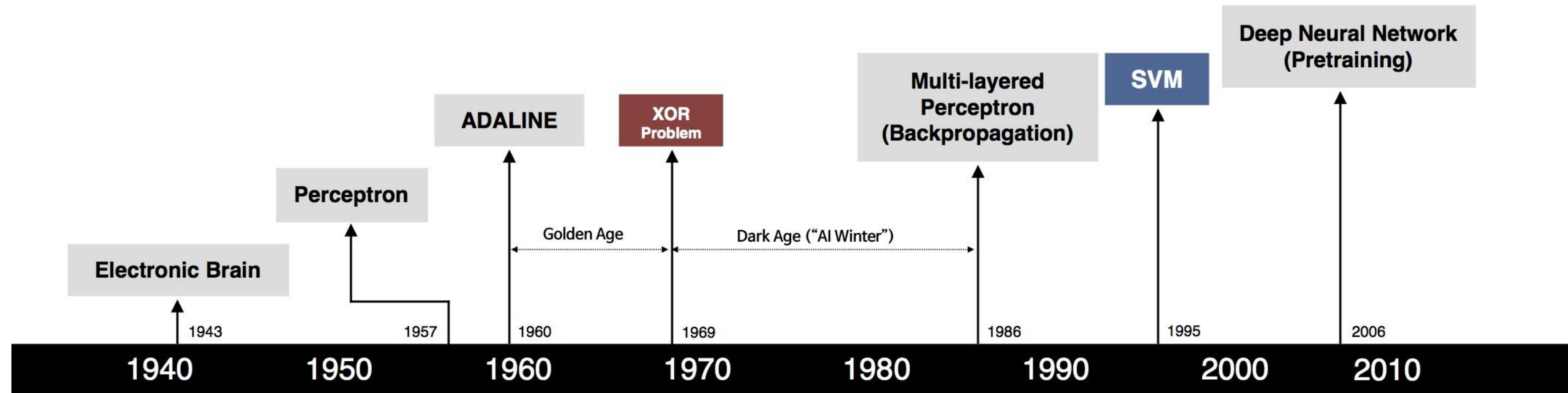
Deep Learning vs Machine Learning



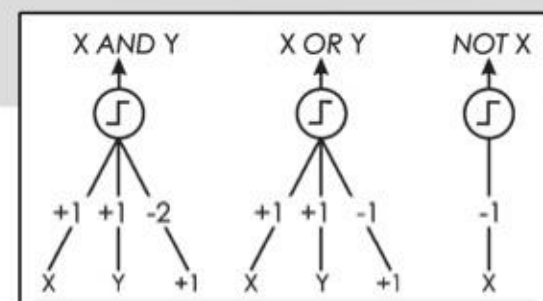
Deep Learning features



Deep Learning timeline



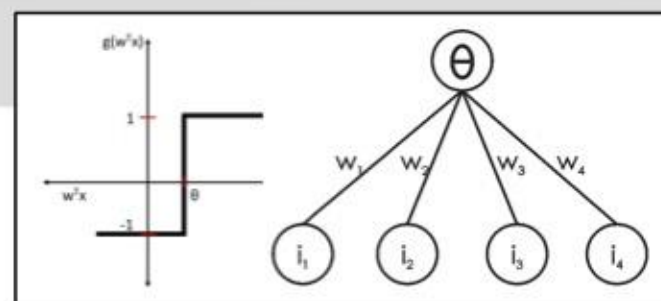
S. McCulloch – W. Pitts



- Adjustable Weights
- Weights are not Learned



F. Rosenblatt



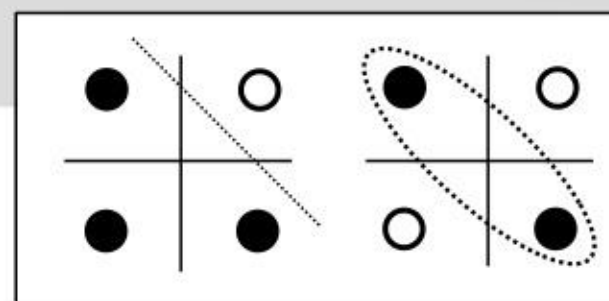
- Learnable Weights and Threshold



B. Widrow – M. Hoff



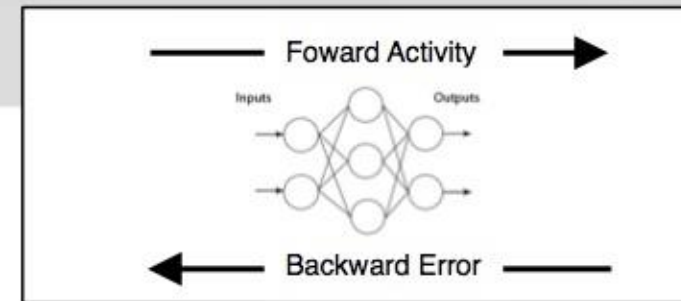
M. Minsky – S. Papert



- XOR Problem



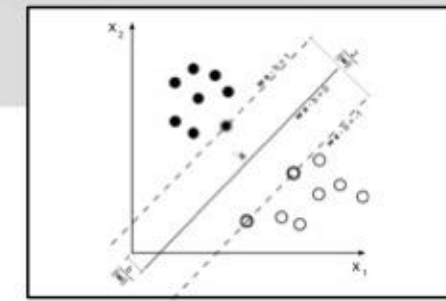
D. Rumelhart – G. Hinton – R. Williams



- Solution to nonlinearly separable problems
- Big computation, local optima and overfitting



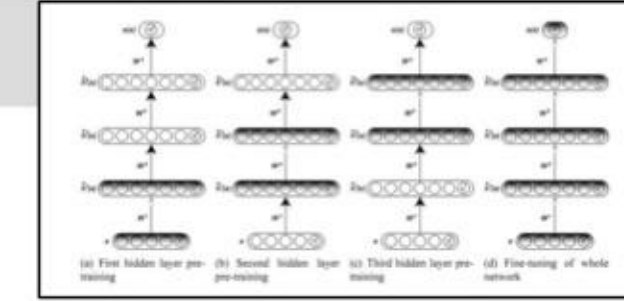
V. Vapnik – C. Cortes



- Limitations of learning prior knowledge
- Kernel function: Human Intervention



G. Hinton – S. Ruslan



- Hierarchical feature Learning

What is deep learning today?

- Autograd (pytorch, tensorflow)
- Billion+ data point datasets
- Parallel training on thousands of GPUs
- Billion+ parameter architectures
- Million+ dollar training costs
- Shockingly good results
- Massive isn't necessary - e.g. Stable Diffusion
- Open source community and modular reuse