“Deep Learning”

a. A neural network goes from one layer to another and computed weighted sum of inputs which are generated from a layer would be passed to the next layer through non-linear functions. A convolutional network typically is used for processing multilayer data sets for instance audio, signals, image processing and video images are the ones located in different layers to be processed dependently.
b. The “feedforward” networks can learn to map a fixed-size input to a fixed-size output. The “backpropagation” algorithm is used to process large data by computing gradients through changing the internal parameters. Once the gradients are computed, the weights of each module are straightforward to be determined.

“Clustering by Compression”

a. The characteristics of a “normal” compressor include the following: Idempotency, monotonicity, symmetry, distributivity and subadditivity. These characteristics determine real-world compressors as well as ensure the desired properties of the NCD. They’re somewhat related to “metric distance” since a metric distance needs to obtain symmetry, triangle inequality and the property of “D (x, y) = 0 iff x = y”. A “normal” compressor and a “metric distance” are connected by the property of distributivity including Kolmogorov Complexity. Kolmogorov Complexity is designed based on metric distance as noted as “E” and able to compute NID and NCD accordingly.
d. I choose using “zip” method which is a type lossless data compression that uses both Huffman coding and LZ77 algorithm.

   For file “t10k-images.idx3-ubyte”, uncompressed file size is 7,840,016 bytes and compressed file size is 1,634,452 bytes.

   For file “t10k-labels.idx1-ubyte”, uncompressed file size is 10,008 bytes and compressed file size is 4,659 bytes.

   For file “train-labels.idx1-ubyte”, uncompressed file size is 60,008 bytes and compressed file size is 29,020 bytes.