**Autoencoder**

* Variational Autoencoding
  + VAE – provides a probabilistic manner for describing an observation in latent space Thus, rather than building an encoder which outputs a single value to describe each latent state attribute, we’ll formulate our encoder to describe a probability distribution for each latent attribute
    - **Latent Space** - simply a representation of compressed data in which similar data points are closer together in space, Latent space is useful for learning data features and for finding representations of data for analysis
    - **Latent State/Traits** - latent state and latent traits are defined as special conditional expectations, A score on a latent state variable is defined as the expectation of an observational variable Yjk given a person ins a situation whereas a score on a latent trait variable is the expectation of Yjk given a person
  + A close up of a logo

    Description automatically generated
  + From Bayesian framework – treat the input, hidden, and output as probabilistic random variables, this makes are model stochastic or completely random
  + A VAE has three essential parts
    - Encoder
    - Decoder
    - Loss Function
* Bayes Theorem
  + In probability theory and statistics, describes the probability of an event, based in prior knowledge of conditions that might be related to the event
  + Posterior = [ (Likelihood) \* (Prior) ] / (Marginal)

**Resources**

* <https://www.tensorflow.org/tutorials/generative/cvae>