Models with NF : NICE

NICE (Non-linear Independent Component Estimation; Dinh, et al. 2015)

- The transformation in NICE is the affine coupling layer without the scale term, known as *additive coupling layer*.

- NF의 구현을 두 부분으로 나누어 구현한다.

  첫부분 => jacobian det을 1로 유지(계산 쉽게).
  두번째 => 역함수 구할 수 있으면서 변조하는.

$$\begin{cases} \mathbf{y}_{1:d} & = \mathbf{x}_{1:d} \\ \mathbf{y}_{d+1:D} & = \mathbf{x}_{d+1:D} + m(\mathbf{x}_{1:d}) \end{cases} \Leftrightarrow \begin{cases} \mathbf{x}_{1:d} & = \mathbf{y}_{1:d} \\ \mathbf{x}_{d+1:D} & = \mathbf{y}_{d+1:D} - m(\mathbf{y}_{1:d}) \end{cases}$$

Models with NF : RealNVP

Real-valued Non-Volume Preserving; Dinh et al., 2017

implements a normalizing flow by stacking a sequence of invertible bijective transformation functions. In each bijection , known as *affine coupling layer*, the input dimensions are split into two parts:

- The first dimensions stay same;
- The second part, to dimensions, undergo an affine transformation ("scale-and-shift") and both the scale and shift parameters are functions of the first dimensions.

$$\mathbf{y}_{1:d} = \mathbf{x}_{1:d}$$

$$\mathbf{y}_{d+1:D} = \mathbf{x}_{d+1:D} \odot \exp(s(\mathbf{x}_{1:d})) + t(\mathbf{x}_{1:d})$$