# 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.

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

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

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- S(.) and t(.)

  scale and translation functions and both map $\mathbb{R}^d \Rightarrow \mathbb{R}^{D-d}$

- ⊙ operation = element-wise product

  같은 크기의 두 행렬의 각 성분을 곱하는 연산이다.

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

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