P(vector) : $nr * (ns+4)+1$.

n Species $\xrightarrow{\text{n Reactions}}$ n Species.

for Reation #1:

$$rate = [S_1]^{v_1}[S_2]^{v_2}\cdots[S_{n_s}]^{v_{n_s}} \cdot AT^b e^{-\frac{E_a}{RT}}$$

$$= \exp\left\{v_1 \ln S_1 + \cdots + v_{ns} \ln S_{n_s} + \ln A + b \ln T - \frac{E_a}{RT}\right\}$$

$\dot{S}_i = v_i \cdot rate$

P ① $1 \sim nr$ (nr个) : $w_b \sim$ ~~E_a~~ $\ln A$. { * slope * 10, clamp (0, 50).

② $nr+1 \sim nr(ns+1)$ (nr*ns个) : $w_{out} \sim v_{ij}$ { 1st species: clamp (-3, 0); last species: clamp (0, 3)

③ $nr(ns+1)+1 \sim nr(ns+2)$ (nr个) : $w_{in-Ea} \sim E_a$ clamp (0, 300)

④ $nr(ns+2)+1 \sim nr(ns+3)$ (nr个) : w_{in-b}

⑤ 氧浓度：忽略. (nr个).

Input: $\begin{bmatrix} S_1 \\ S_2 \\ \vdots \\ S_{n_s} \\ \ln T \\ -\frac{1}{RT} \end{bmatrix}$ $\begin{bmatrix} v_{ij} & & \\ & \ddots & \\ & & v_{ij} \end{bmatrix}_{n_s * n_r}$ w_{in}:

$[Ea_1, \cdots \quad Ea_{n_r}]$

$[b_1 \quad \cdots \quad b_{n_r}]$

$* [ocean]$

CRNN: $\log X = \log [Species]_{(ns*1)}$.

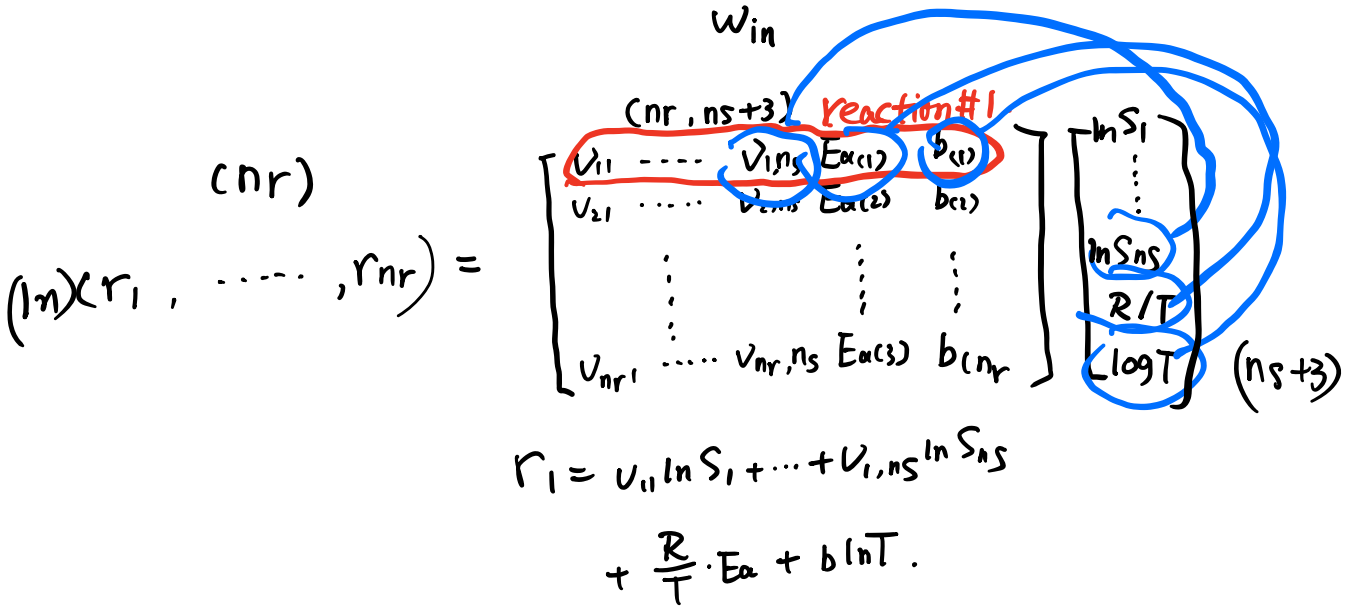
$T = (ns*1)$.

$w_{in\_x} = w_{in}{}'_{(nr*(ns+4c3))} * \begin{bmatrix} \log X \\ R/T \\ \log T \end{bmatrix}_{(ns+3)}$

(nr).

$du = w_{out} * \exp(w_{in\_x} + w_b)$

$(ns*nr) \quad (nr*1)$



$$r_1 = \nu_{11} \ln S_1 + \cdots + \nu_{1,ns} \ln S_{ns} + \frac{R}{T} \cdot E_a + b \ln T .$$

$$(\dot{S}_1, \dot{S}_2, \cdots, \dot{S}_{ns}) = \begin{bmatrix} \nu_{11} & \cdots \\ & \\ & \end{bmatrix} \begin{bmatrix} \ln r_1 + \ln A_1 \\ \vdots \\ \ln r_{nr} + \ln A_{nr} \end{bmatrix}$$

(ns) $\quad (ns * nr)$ $\quad (n_r \times 1)$

$$(\dot{S}_1, \dot{S}_2, \cdots, \dot{S}_{ns}) = CRNN(S_1, \cdots, S_{ns}; p)$$