label: actual returns $r_n = \beta_j f_j + \varepsilon_n$ aim $\longrightarrow$ min $\varepsilon'\varepsilon$

output: model returns $\tilde{r}_n = \beta_j f_j$ dimension: N×1

dot product

betas: β_j dimension: N×J

Neural network

$\mathbf{x}_1\ \mathbf{x}_2 \ldots \qquad \mathbf{x}_N$

input: characteristics
dimension: N×K

beta leg

factors: f_j dimension: J×1

Neural network

$r_1\ r_2 \ldots \qquad r_N$

input: returns
dimension: N×1

factor leg