

Notation	Description
$M$	number of training items
$K$	number of categories
$D$	dimension of the quality variable
$X$	image variable
$Y$	noisy label vector variable
$Z$	latent label vector variable
$S$	quality vector variable
$W_C$	parameter of classifier network
$W_N$	parameter of noise network
$W_Q$	parameter of annotation quality network
$W_L$	parameter of latent label network
$m$	index of an item
$x_m$	$m$ th observed image
$y_m$	$m$ th observed noisy label vector
$z_m$	$m$ th latent label vector
$s_m$	$m$ th quality vector
$\mu$	mean of Gaussian distribution
$\sigma$	covariance diagonal of Gaussian distribution
$\lambda$	regularizaion coefficient
$\gamma_m$	$m$ th sample from Gumbel distribution
$\zeta_m$	$m$ th sample from Gaussian distribution
$\tau$	temperature in Gumbel-SoftMax
$\alpha$	time-varying coefficient