

Supplementary Tables and Figures

Table. S1. Training set construction process

Positive examples in cell-type-naïve gold standard		Two genes of each pair were cell type-specific, or one was cell-type-specific and the other was a house-keeping	
		Yes	No
		Positive pair	Negative pair
	Yes		
	No	Negative pair	Negative pair

Table. S2. The number of gene-pairs in positive and negative classes in different cell types

Cell type	Number of gene pairs in positive class	Number of gene pairs in negative class
Excitatory neurons	54319	162957
Inhibitory neurons	32888	98664
Astrocytes	31772	95315
Endothelial cells	44611	133833
Microglia	43577	130731
Oligodendrocytes	26345	79035
Oligodendrocyte precursor cells	37493	112479

Table. S3. The hyperparameters of MDLCN

Number of filters in the convolutional layers	Kernel size of convolutional layers	Kernel size of max-pooling layers	Size of dense layer in co-expression modality	Size of dense layers in proximity modality	Size of dense layers	Drop-out rate
(32, 64, 128)	4×4	2×2	50	(5, 4, 3, 2)	(50, 20, 10)	0.1

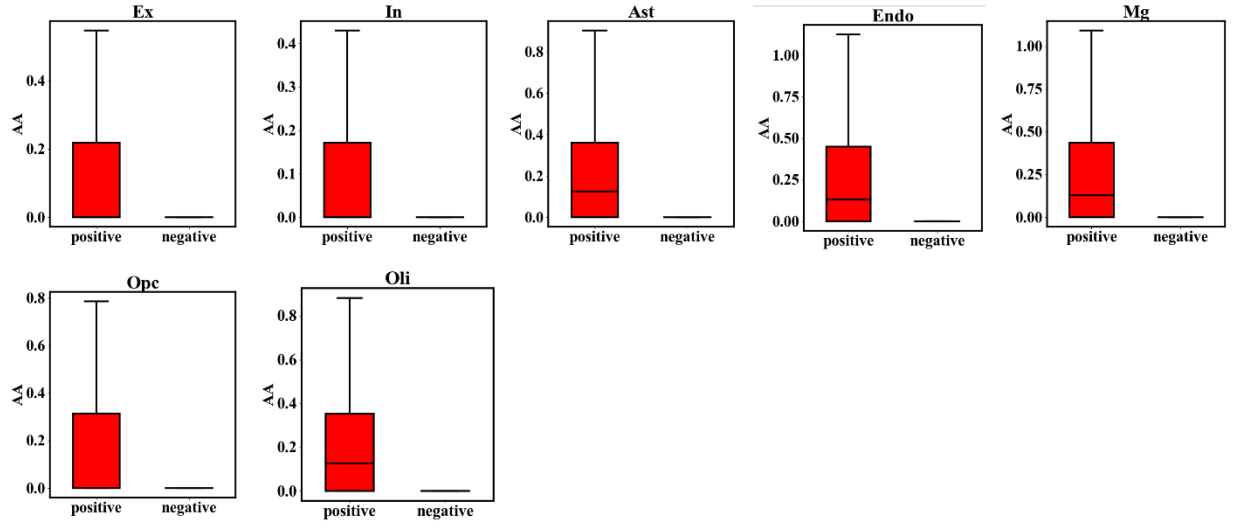


Fig. S. 1. Distribution of AA scores in positive and negative classes for excitatory neurons (Ex), inhibitory neurons (In), astrocytes (Ast), endothelial cells (Endo), microglia (Mg), oligodendrocytes (Oli), and oligodendrocyte precursor cells (Opc).

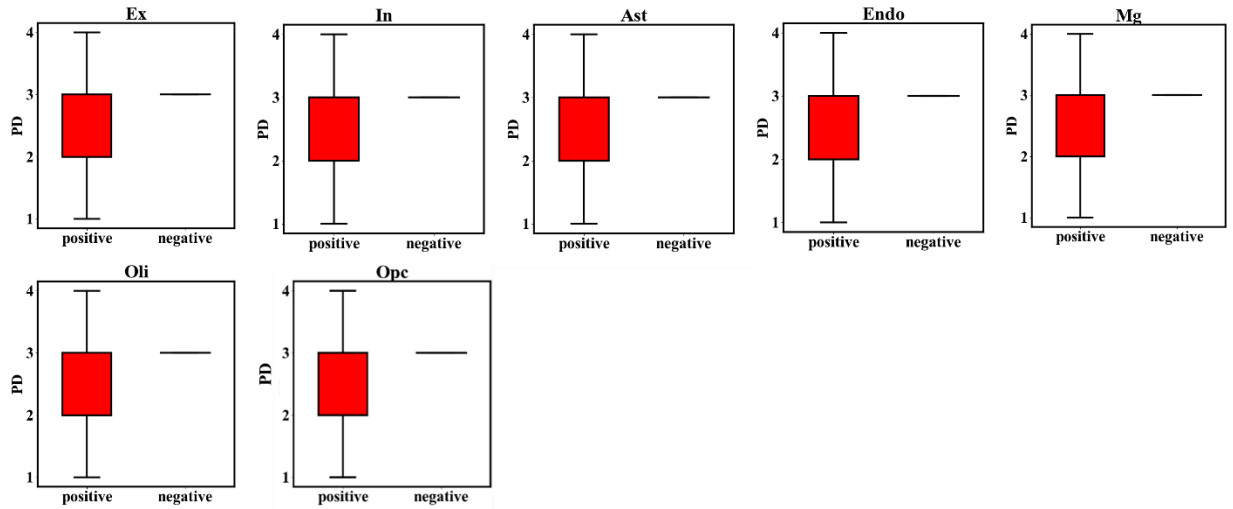


Fig. S. 2. Distribution of PD scores in positive and negative classes for excitatory neurons (Ex), inhibitory neurons (In), astrocytes (Ast), endothelial cells (Endo), microglia (Mg), oligodendrocytes (Oli), and oligodendrocyte precursor cells (Opc).

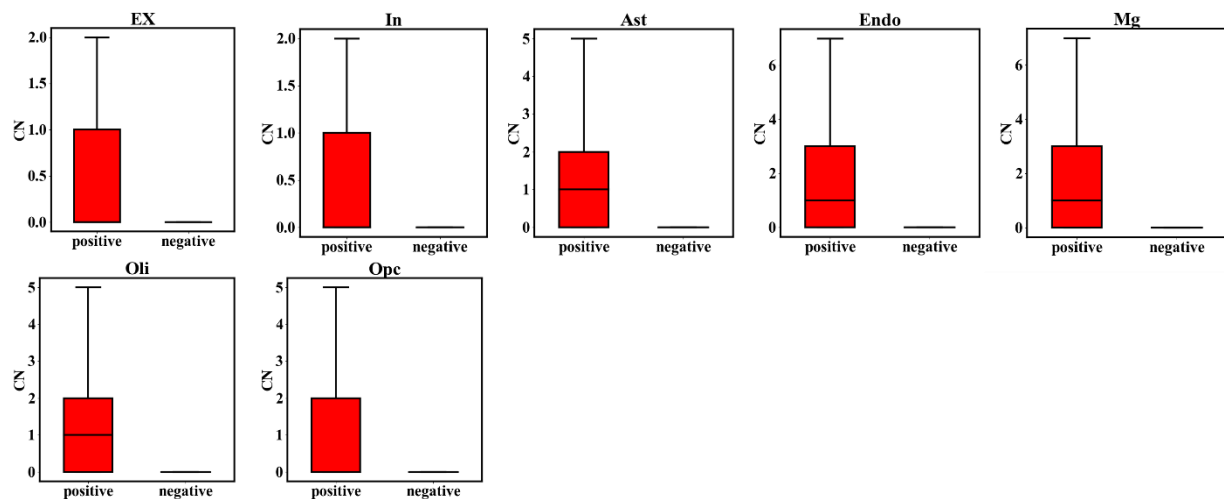


Fig. S. 3. Distribution of CN scores in positive and negative classes for excitatory neurons (Ex), inhibitory neurons (In), astrocytes (Ast), endothelial cells (Endo), microglia (Mg), oligodendrocytes (Oli), and oligodendrocyte precursor cells (Opc).

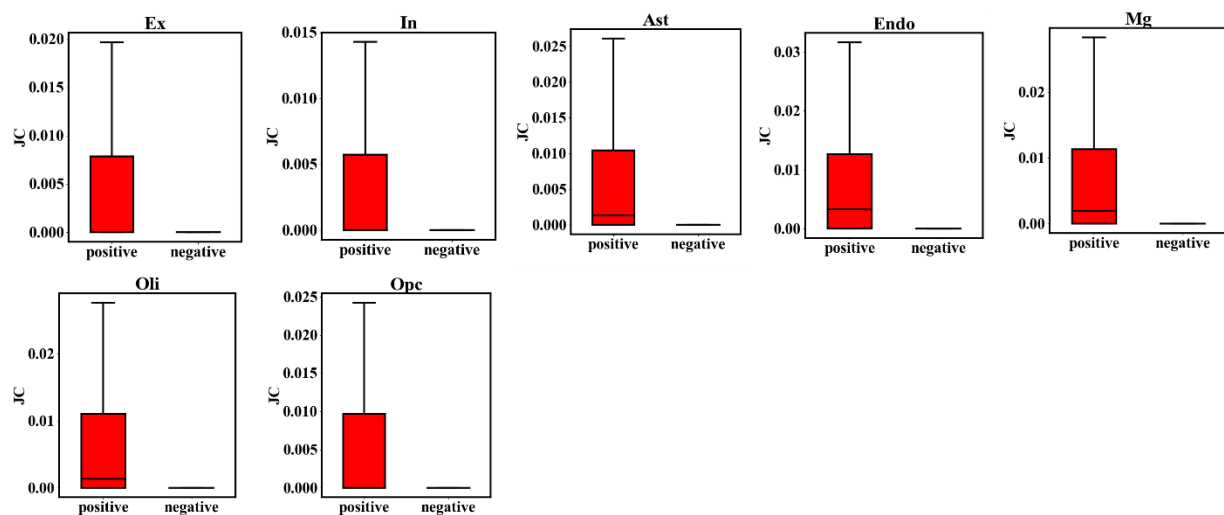


Fig. S. 4. Distribution of JC scores in positive and negative classes for excitatory neurons (Ex), inhibitory neurons (In), astrocytes (Ast), endothelial cells (Endo), microglia (Mg), oligodendrocytes (Oli), and oligodendrocyte precursor cells (Opc).

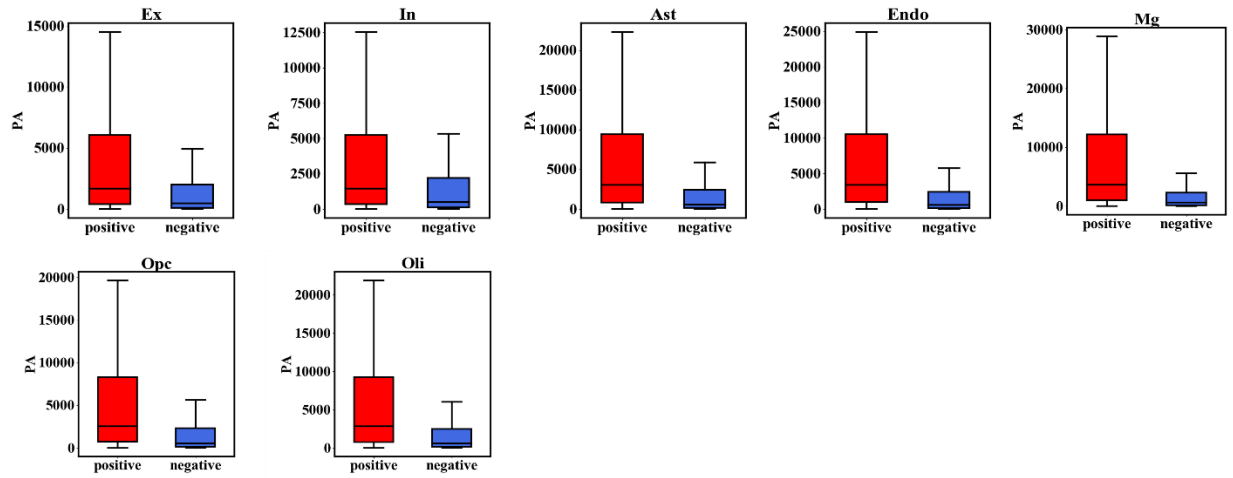


Fig. S. 5. Distribution of PA scores in positive and negative classes for excitatory neurons (Ex), inhibitory neurons (In), astrocytes (Ast), endothelial cells (Endo), microglia (Mg), oligodendrocytes (Oli), and oligodendrocyte precursor cells (Opc).