

Finding Task-Relevant Features for Few-Shot Learning by Category Traversal



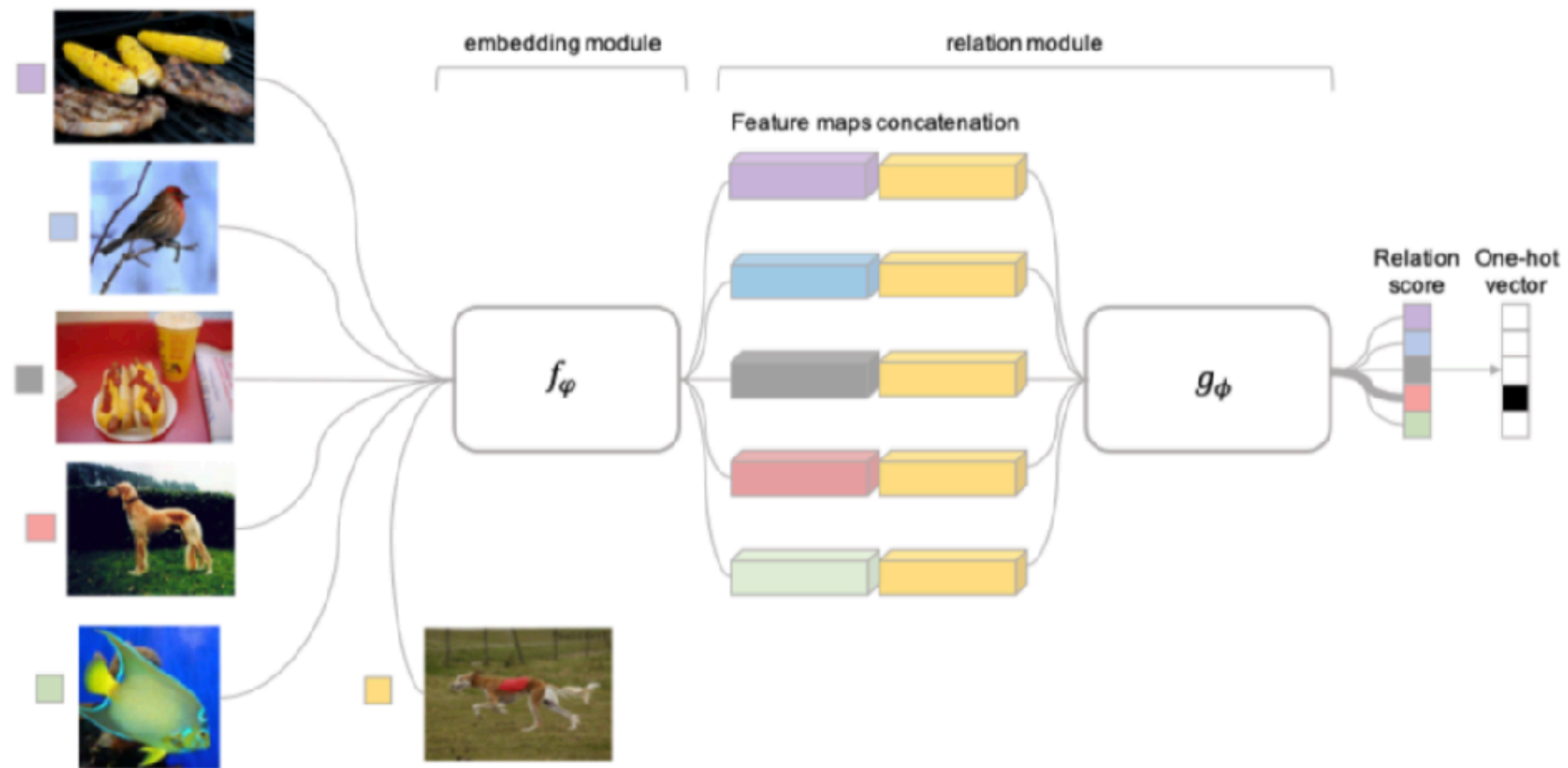
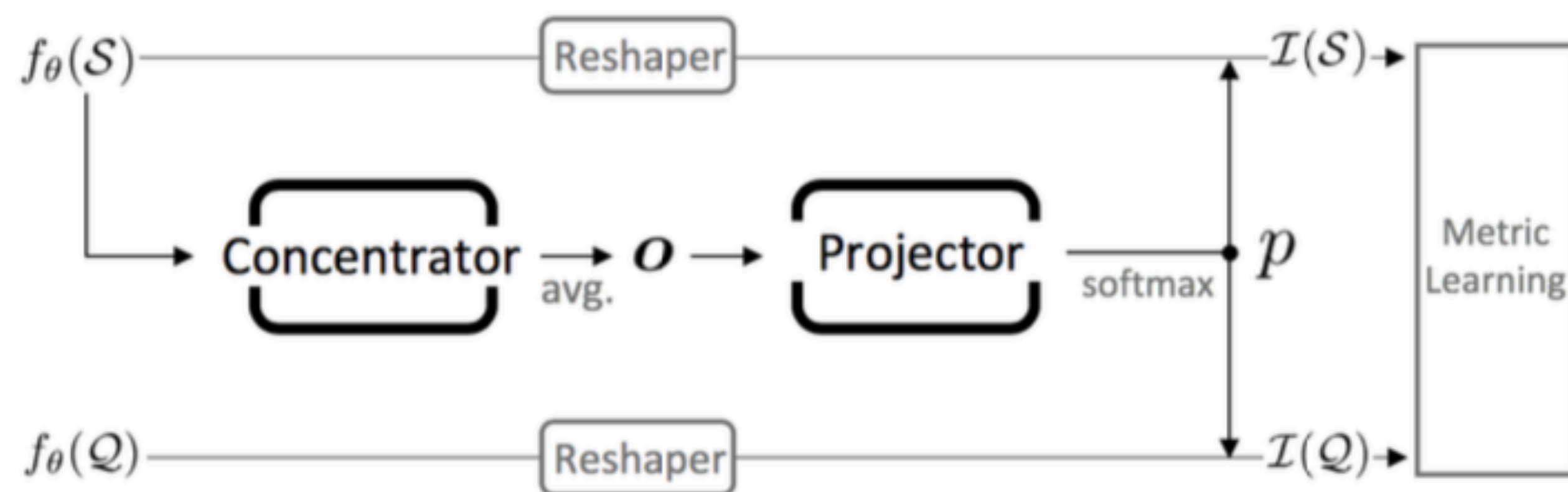


Figure 1: Relation Network architecture for a 5-way 1-shot problem with one query example.

Architecture

$$f_{\theta}(\mathcal{S}) : (NK, m_1, d_1, d_1) \xrightarrow{\text{Concentrator}} \mathbf{o} : (N, m_2, d_2, d_2),$$

$$\hat{\mathbf{o}} : (1, Nm_2, d_2, d_2) \xrightarrow{\text{Projector}} p : (1, m_3, d_3, d_3).$$



$$f_{\theta}(\cdot) \xrightarrow{\text{Reshaper}} \mathbf{r}(\cdot) : (NK, m_3, d_3, d_3).$$

$$\text{option 1: } \mathcal{I}^1(\mathcal{S}) = \mathbf{r}(\mathcal{S}) \odot p : (NK, m_3, d_3, d_3),$$

$$\text{option 2: } \mathcal{I}^2(\mathcal{S}) = \mathbf{o} \odot p : (N, m_3, d_3, d_3).$$

Method	5-way		20-way		5-way		20-way	
	1-shot	5-shot	1-shot	5-shot	1-shot	5-shot	1-shot	5-shot
Matching Net [38], <i>paper</i>	43.56	55.31	-	-	-	-	-	-
Matching Net [38], <i>our implementation</i>	48.89	66.35	23.18	36.73	54.02	70.11	23.46	41.65
Matching Net [38], <i>CTM</i>	52.43	70.09	25.84	40.98	57.01	73.45	25.69	45.07
	+3.54	+3.74	+2.66	+4.25	+2.99	+3.34	+2.23	+3.42
Prototypical Net [35], <i>paper</i>	49.42	68.20	-	-	53.31	72.69	-	-
Prototypical Net [35], <i>our implementation</i>	56.11	74.16	28.53	42.36	60.27	75.80	28.56	49.34
Prototypical Net [35], <i>CTM</i>	59.34	77.95	32.08	47.11	63.77	79.24	31.02	51.44
	+3.23	+3.79	+3.55	+4.75	+3.50	+3.44	+2.46	+2.10
Relation Net [36], <i>paper</i>	50.44	65.32	-	-	54.48	71.32	-	-
Relation Net [36], <i>our implementation</i>	58.21	74.29	31.35	45.19	61.11	77.39	26.77	47.82
Relation Net [36], <i>CTM</i>	62.05	78.63	35.11	48.72	64.78	81.05	31.53	52.18
	+3.84	+4.34	+3.76	+3.53	+3.67	+3.66	+4.76	+4.36

Table 2: Improvement after incorporating CTM into existing methods on miniImageNet (left) and tieredImageNet (right).