

Table 1: Reference of HLP tasks using different meta-learning methods.

	(A) Learning to initialize	(B) Learning to compare	(C) Other
Sound Event Detection	(Shi et al., 2020)	(Shimada et al., 2020a) (Chou et al., 2019) (Wang et al., 2020) (Shimada et al., 2020b) (Shi et al., 2020)	Network architecture search: (Li et al., 2020)
Keyword Spotting	(Chen et al., 2020a)	(Huh et al., 2020)	Net2Net: (Veniat et al., 2019) Network architecture search: (Mazzawi et al., 2019) Network architecture search: (Mo et al., 2020)
Text Classification	(Dou et al., 2019) (Bansal et al., 2019)	(Yu et al., 2018) (Tan et al., 2019) (Geng et al., 2019) (Sun et al., 2019)	Learning the learning algorithm: (Wu et al., 2019)
Voice Cloning			Learning the learning algorithm: (Chen et al., 2019b) (Serrà et al., 2019)
Sequence Labeling	(Wu et al., 2020)	(Hou et al., 2020)	
Machine Translation	(Gu et al., 2018) (Indurthi et al., 2020)		
Speech Recognition	(Hsu et al., 2020) (Klejch et al., 2019) (Winata et al., 2020a) (Winata et al., 2020b)		Learning to optimize: (Klejch et al., 2018) Network architecture search: (Chen et al., 2020b) (Baruwa et al., 2019)
Knowledge Graph	(Obamuyide and Vlachos, 2019) (Bose et al., 2019) (Lv et al., 2019) (Wang et al., 2019)	(Ye and Ling, 2019) (Chen et al., 2019a) (Xiong et al., 2018) (Gao et al., 2019)	
Dialogue / Chatbot	(Qian and Yu, 2019) (Madotto et al., 2019) (Mi et al., 2019)		Learning to optimize: (Chien and Lieow, 2019)
Parsing	(Guo et al., 2019) (Huang et al., 2018)		
Word Embedding	(Hu et al., 2019)	(Sun et al., 2018)	
Multi-model		(Eloff et al., 2019)	Learning the learning algorithm: (Surís et al., 2019)

## References

- Trapit Bansal, Rishikesh Jha, and Andrew McCallum. 2019. Learning to few-shot learn across diverse natural language classification tasks. In *arXiv*.
- Ahmed Baruwa, Mojeed Abisiga, Ibrahim Gbadegesin, and Afeez Fakunle. 2019. Leveraging end-to-end speech recognition with neural architecture search. In *IJSER*.
- Avishek Joey Bose, Ankit Jain, Piero Molino, and William L. Hamilton. 2019. Meta-graph:few shot link prediction via meta learning. In *arXiv*.
- Mingyang Chen, Wen Zhang, Wei Zhang, Qiang Chen, and Huajun Chen. 2019a. Meta relational learning for few-shot link prediction in knowledge graphs. In *EMNLP*.
- Yangbin Chen, Tom Ko, Lifeng Shang, Xiao Chen, Xin Jiang, and Qing Li. 2020a. An investigation of few-shot learning in spoken term classification. In *INTERSPEECH*.
- Yi-Chen Chen, Jui-Yang Hsu, Cheng-Kuang Lee, and Hung yi Lee. 2020b. DARTS-ASR: Differentiable architecture search for multilingual speech recognition and adaptation. In *INTERSPEECH*.
- Yutian Chen, Yannis Assael, Brendan Shillingford, David Budden, Scott Reed, Heiga Zen, Quan Wang, Luis C. Cobo, Andrew Trask, Ben Laurie, Caglar Gulcehre, Aäron van den Oord, Oriol Vinyals, and Nando de Freitas. 2019b. Sample efficient adaptive text-to-speech. In *ICLR*.

- Jen-Tzung Chien and Wei Xiang Lieow. 2019. Meta learning for hyperparameter optimization in dialogue system. In *INTER-SPEECH*.
- Szu-Yu Chou, Kai-Hsiang Cheng, Jyh-Shing Roger Jang, and Yi-Hsuan Yang. 2019. Learning to match transient sound events using attentional similarity for few-shot sound recognition. In *ICASSP*.
- Zi-Yi Dou, Keyi Yu, and Antonios Anastasopoulos. 2019. Investigating meta-learning algorithms for low-resource natural language understanding tasks. In *EMNLP*.
- Ryan Eloff, Herman A. Engelbrecht, and Herman Kamper. 2019. Multimodal one-shot learning of speech and images. In *ICASSP*.
- Tianyu Gao, Xu Han, Zhiyuan Liu, and Maosong Sun. 2019. Hybrid attention-based prototypical networks for noisy few-shot relation classification. In *AAAI*.
- Ruiying Geng, Binhua Li, Yongbin Li, Xiaodan Zhu, Ping Jian, and Jian Sun. 2019. Induction networks for few-shot text classification. In *EMNLP*.
- Jiatao Gu, Yong Wang, Yun Chen, Kyunghyun Cho, and Victor O.K. Li. 2018. Meta-learning for low-resource neural machine translation. In *EMNLP*.
- Daya Guo, Duyu Tang, Nan Duan, Ming Zhou, and Jian Yin. 2019. Coupling retrieval and meta-learning for context-dependent semantic parsing. In *ACL*.
- Yutai Hou, Wanxiang Che, Yongkui Lai, Zhihan Zhou, Yijia Liu, Han Liu, and Ting Liu. 2020. Few-shot slot tagging with collapsed dependency transfer and label-enhanced task-adaptive projection network. In *ACL*.
- Jui-Yang Hsu, Yuan-Jui Chen, and Hung yi Lee. 2020. Meta learning for end-to-end low-resource speech recognition. In *ICASSP*.
- Ziniu Hu, Ting Chen, Kai-Wei Chang, and Yizhou Sun. 2019. Few-shot representation learning for out-of-vocabulary words. In *ACL*.
- Po-Sen Huang, Chenglong Wang, Rishabh Singh, Wen tau Yih, and Xiaodong He. 2018. Natural language to structured query generation via meta-learning. In *NAACL*.
- Jaesung Huh, Minjae Lee, Heesoo Heo, Seongkyu Mun, and Joon Son Chung. 2020. Metric learning for keyword spotting. In *arXiv*.
- Sathish Indurthi, Houjeung Han, Nikhil Kumar Lakumarapu, Beomseok Lee, Insoo Chung, Sangha Kim, and Chanwoo Kim. 2020. Data efficient direct speech-to-text translation with modality agnostic meta-learning. In *ICASSP*.
- Ondřej Klejch, Joachim Fainberg, and Peter Bell. 2018. Learning to adapt: a meta-learning approach for speaker adaptation. In *INTERSPEECH*.
- Ondřej Klejch, Joachim Fainberg, Peter Bell, and Steve Renals. 2019. Speaker adaptive training using model agnostic meta-learning. In *ASRU*.
- Jixiang Li, Chuming Liang, Bo Zhang, Zhao Wang, Fei Xiang, and Xiangxiang Chu. 2020. Neural architecture search on acoustic scene classification. In *INTERSPEECH*.
- Xin Lv, Yuxian Gu, Xu Han, Lei Hou, Juanzi Li, and Zhiyuan Liu. 2019. Adapting meta knowledge graph information for multi-hop reasoning over few-shot relations. In *EMNLP*.
- Andrea Madotto, Zhaojiang Lin, Chien-Sheng Wu, and Pascale Fung. 2019. Personalizing dialogue agents via meta-learning. In *ACL*.
- Hanna Mazzawi, Xavi Gonzalvo, Aleks Kracun, Prashant Sridhar, Niranjan Subrahmanya, Ignacio Lopez Moreno, Hyun Jin Park, and Patrick Violette. 2019. Improving keyword spotting and language identification via neural architecture search at scale. In *INTERSPEECH*.
- Fei Mi, Minlie Huang, Jiyong Zhang, and Boi Faltings. 2019. Meta-learning for low-resource natural language generation in task-oriented dialogue systems. In *IJCAI*.
- Tong Mo, Yakun Yu, Mohammad Salameh, Di Niu, and Shangling Jui. 2020. Neural architecture search for keyword spotting. In *INTERSPEECH*.
- Abiola Obamuyide and Andreas Vlachos. 2019. Model-agnostic meta-learning for relation classification with limited supervision. In *ACL*.
- Kun Qian and Zhou Yu. 2019. Domain adaptive dialog generation via meta learning. In *ACL*.
- Joan Serrà, Santiago Pascual, and Carlos Segura. 2019. Blow: a single-scale hyperconditioned flow for non-parallel raw-audio voice conversion. In *NeurIPS*.

- Bowen Shi, Ming Sun, Krishna C. Puvvada, Chieh-Chi Kao, Spyros Matsoukas, and Chao Wang. 2020. Few-shot acoustic event detection via meta learning. In *ICASSP*.
- Kazuki Shimada, Yuichiro Koyama, and Akira Inoue. 2020a. Metric learning with background noise class for few-shot detection of rare sound events. In *ICASSP*.
- Kazuki Shimada, Yuichiro Koyama, and Akira Inoue. 2020b. Metric learning with background noise class for few-shot detection of rare sound events. In *ICASSP*.
- Jingyuan Sun, Shaonan Wang, and Chengqing Zong. 2018. Memory, show the way:memory based few shot word representation learning. In *EMNLP*.
- Shengli Sun, Qingfeng Sun, Kevin Zhou, and Tengchao Lv. 2019. Hierarchical attention prototypical networks for few-shot text classification. In *EMNLP*.
- Dídac Surfís, Dave Epstein, Heng Ji, Shih-Fu Chang, and Carl Vondrick. 2019. Learning to learn words from narrated video. In *arXiv*.
- Ming Tan, Yang Yu, Haoyu Wang, Dakuo Wang, Saloni Potdar, Shiyu Chang, and Mo Yu. 2019. Out-of-domain detection for low-resource text classification tasks. In *EMNLP*.
- Tom Veniat, Olivier Schwander, and Ludovic Denoyer. 2019. Stochastic adaptive neural architecture search for keyword spotting. In *ICASSP*.
- Yu Wang, Justin Salamon, Nicholas J. Bryan, and Juan Pablo Bello. 2020. Few-shot sound event detection. In *ICASSP*.
- Zihao Wang, Kwun Ping Lai, Piji Li, Lidong Bing, and Wai Lam. 2019. Tackling long-tailed relations and uncommon entities in knowledge graph completion. In *EMNLP*.
- Genta Indra Winata, Samuel Cahyawijaya, Zhaojiang Lin, Zihan Liu, Peng Xu, and Pascale Fung. 2020a. Meta-transfer learning for code-switched speech recognition. In *ACL*.
- Genta Indra Winata, Samuel Cahyawijaya, Zihan Liu, Zhaojiang Lin, Andrea Madotto, Peng Xu, and Pascale Fung. 2020b. Learning fast adaptation on cross-accented speech recognition. In *INTERSPEECH*.
- Jiawei Wu, Wenhan Xiong, and William Yang Wang. 2019. Learning to learn and predict: A meta-learning approach for multi-label classification. In *EMNLP*.
- Qianhui Wu, Zijia Lin, Guoxin Wang, Hui Chen, Börje F. Karlsson, Biqing Huang, and Chin-Yew Lin. 2020. Enhanced meta-learning for cross-lingual named entity recognition with minimal resources. In *AAAI*.
- Wenhan Xiong, Mo Yu, Shiyu Chang, Xiaoxiao Guo, and William Yang Wang. 2018. One-shot relational learning for knowledge graphs. In *EMNLP*.
- Zhi-Xiu Ye and Zhen-Hua Ling. 2019. Multi-level matching and aggregation network for few-shot relation classification. In *ACL*.
- Mo Yu, Xiaoxiao Guo, Jinfeng Yi, Shiyu Chang, Saloni Potdar, Yu Cheng, Gerald Tesauro, Haoyu Wang, and Bowen Zhou. 2018. Diverse few-shot text classification with multiple metrics. In *ACL*.