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1. **arXiv:2211.15661** [pdf, other] `cs.LG` `cs.CL`

   ## What learning algorithm is in-context learning? Investigations with linear models

   Authors: Ekin Akyürek, Dale Schuurmans, Jacob Andreas, Tengyu Ma, Denny Zhou

   Abstract: Neural sequence models, especially transformers, exhibit a remarkable capacity for in-context learning. They can construct new predictors from sequences of labeled examples $(x, f(x))$ presented in the input without further parameter updates. We investigate the hypothesis that transformer-based in-context learners implement standard learning algorithms implicitly, by encoding smaller models in the... ▽ More

   Submitted 28 November, 2022; v1 submitted 28 November, 2022; **originally announced** November 2022.
   Comments: fix url in the abstract

2. **arXiv:2209.15003** [pdf, other] `cs.CL` `cs.AI`

   ## Compositional Semantic Parsing with Large Language Models

   Authors: Andrew Drozdov, Nathanael Schärli, Ekin Akyürek, Nathan Scales, Xinying Song, Xinyun Chen, Olivier Bousquet, Denny Zhou

   Abstract: Humans can reason compositionally when presented with new tasks. Previous research shows that appropriate prompting techniques enable large language models (LLMs) to solve artificial compositional generalization tasks such as SCAN. In this work, we identify additional challenges in more realistic semantic parsing tasks with larger vocabulary and refine these prompting techniques to address them. O... ▽ More

   Submitted 29 September, 2022; v1 submitted 29 September, 2022; **originally announced** September 2022.
   Comments: Fixed metadata. No other changes

3. **arXiv:2205.11482** [pdf, other] `cs.CL` `cs.IR`

   ## Towards Tracing Factual Knowledge in Language Models Back to the Training Data

   Authors: Ekin Akyürek, Tolga Bolukbasi, Frederick Liu, Binbin Xiong, Ian Tenney, Jacob Andreas, Kelvin Guu

   Abstract: Language models (LMs) have been shown to memorize a great deal of factual knowledge contained in their training data. But when an LM generates an assertion, it is often difficult to determine where it learned this information and whether it is true. In this paper, we propose the problem of fact tracing: identifying which training examples taught an LM to generate a particular factual assertion. Pr... ▽ More

   Submitted 25 October, 2022; v1 submitted 23 May, 2022; **originally announced** May 2022.
   Comments: Findings of EMNLP, 2022

4. **arXiv:2202.01771** [pdf, other] `cs.LG` `cs.CL`

   ## Pre-Trained Language Models for Interactive Decision-Making

   Authors: Shuang Li, Xavier Puig, Chris Paxton, Yilun Du, Clinton Wang, Linxi Fan, Tao Chen, De-An Huang, Ekin Akyürek, Anima Anandkumar, Jacob Andreas, Igor Mordatch, Antonio Torralba, Yuke Zhu

   Abstract: Language model (LM) pre-training is useful in many language processing tasks. But can pre-trained LMs be further leveraged for more general machine learning problems? We propose an approach for using LMs to scaffold learning and generalization in general sequential decision-making problems. In this approach, goals and observations are represented as a sequence of embeddings, and a policy network i... ▽ More

   Submitted 29 October, 2022; v1 submitted 3 February, 2022; **originally announced** February 2022.

5. **arXiv:2201.12926** [pdf, other] `cs.CL` `cs.CV` `cs.LG`

   ## Compositionality as Lexical Symmetry

   Authors: Ekin Akyürek, Jacob Andreas

   Abstract: Standard deep network models lack the inductive biases needed to generalize compositionally in tasks like semantic parsing, translation, and question answering. A large body of work in natural language processing seeks to overcome this limitation with new model architectures that enforce a compositional process of sentence interpretation. In this paper, we present a domain-general framework for co... ▽ More

   Submitted 30 January, 2022; **originally announced** January 2022.
   Comments: 12 pages, 3 Figures

6. **arXiv:2110.07059** [pdf, other] `cs.CV` `cs.LG`

   ## Subspace Regularizers for Few-Shot Class Incremental Learning

   Authors: Afra Feyza Akyürek, Ekin Akyürek, Derry Tanti Wijaya, Jacob Andreas

   Abstract: Few-shot class incremental learning -- the problem of updating a trained classifier to discriminate among an expanded set of classes with limited labeled data -- is a key challenge for machine learning systems deployed in non-stationary environments. Existing approaches to the problem rely on complex model architectures and training procedures that are difficult to tune and re-use. In this paper,... ▽ More

   Submitted 20 February, 2022; v1 submitted 13 October, 2021; **originally announced** October 2021.
   Comments: ICLR 2022. Code is available through https://github.com/feyzaakyurek/subspace-reg

7. **arXiv:2106.03993** [pdf, other] `cs.CL` `cs.LG`

   ## Lexicon Learning for Few-Shot Neural Sequence Modeling

   Authors: Ekin Akyürek, Jacob Andreas

   Abstract: Sequence-to-sequence transduction is the core problem in language processing applications as diverse as semantic parsing, machine translation, and instruction following. The neural network models that provide the dominant solution to these problems are brittle, especially in low-resource settings: they fail to generalize correctly or systematically from small datasets. Past work has shown that man... ▽ More

   Submitted 7 June, 2021; **originally announced** June 2021.
   Comments: ACL 2021

8. **arXiv:2010.03706** [pdf, other] `cs.CL` `cs.LG`

   ## Learning to Recombine and Resample Data for Compositional Generalization

   Authors: Ekin Akyürek, Afra Feyza Akyürek, Jacob Andreas

   Abstract: Flexible neural sequence models outperform grammar- and automaton-based counterparts on a variety of tasks. However, neural models perform poorly in settings requiring compositional generalization beyond the training data -- particularly to rare or unseen subsequences. Past work has found symbolic scaffolding (e.g. grammars or automata) essential in these settings. We describe R&R, a learned data... ▽ More

   Submitted 7 June, 2021; v1 submitted 7 October, 2020; **originally announced** October 2020.
   Comments: ICLR2021

9. **arXiv:1805.07946** [pdf, other] `cs.CL` doi 10.1162/tacl_a_00286

   ## Morphological analysis using a sequence decoder

   Authors: Ekin Akyürek, Erenay Dayanık, Deniz Yuret

   Abstract: We introduce Morse, a recurrent encoder-decoder model that produces morphological analyses of each word in a sentence. The encoder turns the relevant information about the word and its context into a fixed size vector representation and the decoder generates the sequence of characters for the lemma followed by a sequence of individual morphological features. We show that generating morphological f... ▽ More

   Submitted 24 September, 2019; v1 submitted 21 May, 2018; **originally announced** May 2018.
   Comments: Final TACL version
   Journal ref: Transactions Of The Association For Computational Linguistics, 7, 567-579 (2019)

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