Register Always Matters: Analysis of LLM Pretraining Data Through the Lens of Language Variation

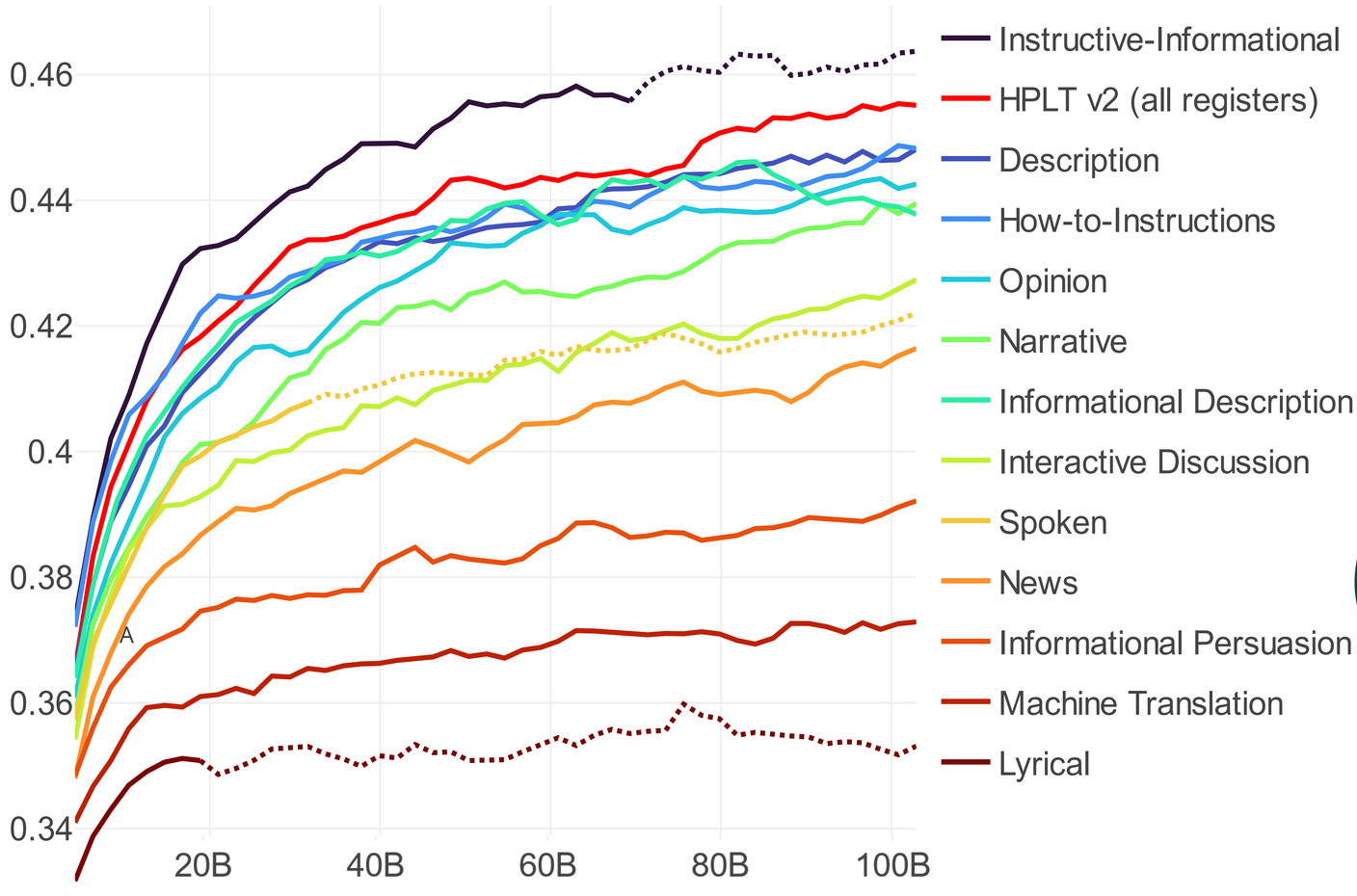
Amanda Myntti, Erik Henriksson, Veronika Laippala, Sampo Pyysalo

TurkuNLP, University of Turku

We evaluate the effects of the linguistic register (or genre) on LLM performance by training identical generative models with register-filtered datasets. We then evaluate and compare these models using well-known benchmarks, revealing how each register impacts model capabilities.

REGISTERS
Situationally characterized text varieties, including categories such as *news*, *reviews* and *song lyrics*

DATA
Register classified HPLT v2 [1]



MODELS
Llama 1.71B, trained up to 100B tokens

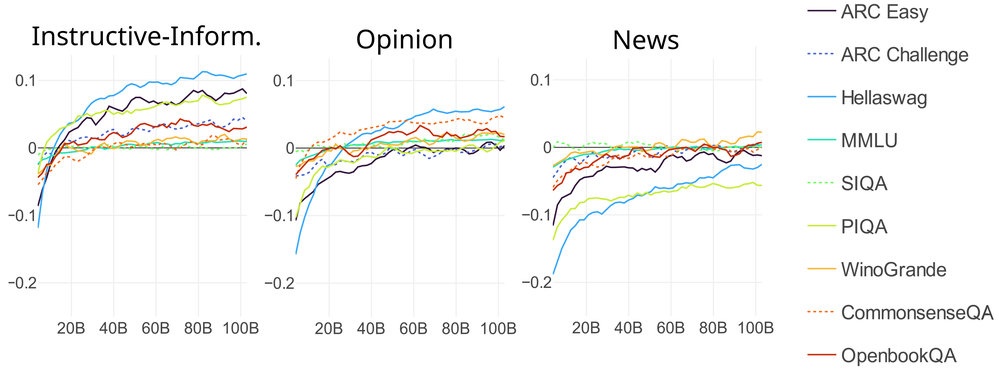
BENCHMARKS
HellaSwag [2], WinoGrande [3], PIQA [4], SIQA [5], OpenBookQA [6], ARC Easy & Challenge [7], CommonsenseQA [8], and MMLU [9].

We additionally evaluate combinations of registers! See our full paper

Full paper

This poster

Our results show that the ranking of registers somewhat aligns with intuitions about their content, like informational and instructive texts yielding powerful models. Yet surprisingly, *Opinion* yields the 4th best performing model, and the *News* register performs among the worst. Combinations of selected registers further improve performance.



[1] Burchell et al. (2025) An Expanded Massive Multilingual Dataset for High-Performance Language Technologies (HPLT)
[2] Zellers et al. (2025) HellaSwag: Can a Machine Really Finish Your Sentence?
[3] Sakaguchi et al. (2021) WinoGrande: an adversarial winograd schema challenge at scale
[4] Bisk et al. (2019) PIQA: Reasoning about Physical Commonsense in Natural Language
[5] Sap et al. (2019) Social IQa: Commonsense Reasoning about Social Interactions
[6] Mihaylov et al. (2018) Can a Suit of Armor Conduct Electricity? A New Dataset for Open Book Question Answering
[7] Clark et al. (2018) Think you have Solved Question Answering? Try ARC, the AI2 Reasoning Challenge
[8] Talmor et al. (2019) CommonsenseQA: A Question Answering Challenge Targeting Commonsense Knowledge
[9] Hendrycks et al. (2020) Measuring Massive Multitask Language Understanding

Methodology inspired by Penedo et al. (2024) The FineWeb Datasets: Decanting the Web for the Finest Text Data at Scale

TURKUNLP .ORG

UNIVERSITY OF TURKU

AI-DOC
Finnish Doctoral Program Network in Artificial Intelligence

High Performance Language Technologies

OPEN EURO LLM