January, 2022

Mega AI, an internal investment at Pacific Northwest National Laboratory, aims to develop next-generation artificial intelligence (AI) capabilities unique to the Department of Energy's national laboratory system. These capabilities will be used to address research gaps in large-scale, multimodal representation learning; multitask inferences; and the need for increased generalizability, rapid adaptivity, and usability of AI technologies. In this newsletter, we highlight recent developments in the research community on next-generation AI technologies focusing on massive-scale model development, deployment and evaluation, data and code availability, model interactions, and new features and capabilities that are relevant to Mega AI's goals and science and security applications.

NEW MODELS AND CAPABILITIES

- **December 1 | Article:** *Google, Cambridge U & Alan Turing Institute Propose PolyViT: A Universal Transformer for Image, Video, and Audio Classification.* READ MORE
- **December 8 | Blog:** *Language Modelling at Scale: Gopher, Ethical considerations, and Retrieval.* READ MORE
- **December 8 | Paper:** *Scaling Language Models: Methods, Analysis & Insights from Training Gopher.* READ MORE
- **December 10 | Article:** DeepMind says its new language model can beat others 25 times its size. READ MORE
- **December 13 | Paper:** *GLaM: Efficient Scaling of Language Models with Mixture-of-Experts.* READ MORE

- **December 14 | Blog:** *Azure AI milestone: New foundation model Florence v1.0 advances state of the art, topping popular computer vision leaderboards.* READ MORE
- **December 20 | Paper:** *GLIDE: Towards Photorealistic Image Generation and Editing with Text-Guided Diffusion Models.* READ MORE
- **December 21 | Paper:** *Few-shot Learning with Multilingual Language Models.* READ MORE
- **January 11, 2022 | Paper:** *Retrieval-Enhanced Transformer (Retro): Improving language models by retrieving from trillions of tokens.* READ MORE

NEW CODE FOR REPRODUCIBILITY

- **GitHub | Code:** Official codebase for running the small, filtered-data GLIDE model from GLIDE: Towards Photorealistic Image Generation and Editing with Text-Guided Diffusion Models. READ MORE

NEW DATASETS FOR TRAINING AND EVALUATION

- **December 14 | Speech Datasets:** *MLCommons releases open source datasets for speech recognition.* READ MORE

HIGHLIGHTED TECHNICAL RESOURCES

- **March 3 | Article:** *Robo-writers: the rise and risks of language-generating AI.* READ MORE

NEW REPORTS AND STUDIES

- **June 28 | Paper:** *SUPER: SUb-Graph Parallelism for TransformERs.* READ MORE
- **December 8 | Paper:** Ethical and social risks of harm from Language Models. READ MORE
- **December 9 | Article:** A Cartel of Influential Datasets Is Dominating Machine Learning Research, New Study Suggests. READ MORE

- o **Paper referenced in article:** *Reduced, Reused and Recycled: The Life of a Dataset in Machine Learning Research:* READ MORE
- **December 10 | Blog:** *Meta AI research at NeurIPS 2021: Embodied agents, unsupervised speech recognition, and more.* READ MORE
- **December 10 | Article:** *DeepMind AI tackles one of chemistry's most valuable techniques.* READ MORE

COMMUNITY DISCUSSION

- **November 15 | Article:** *'Foundation models' may be the future of AI. They're also deeply flawed.* READ MORE
- **December 6 | Article:** *How AI21 Labs Is Reimagining the Way We Read and Write.* READ MORE
- **December 13 | Blog:** *Announcing the Transactions on Machine Learning Research.* READ MORE

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