Samir Yitzhak Gadre

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Research interests

Pre-training: datasets, language and multimodal modeling, scaling

Research summary

I study large-scale dataset construction and model training with an emphasis on understanding how model performance improves predictably with better datasets and bigger models. Nowadays, I investigate these interests in the context of multimodal models (e.g., DataComp) and language models (e.g., OpenLM).

Education

Sept 2020–Present **Columbia University**, Computer Science Ph.D. candidate, *GPA:* 4.0, *Advisor:* Professor Shuran Song (now @ Stanford)

Sept 2014–May 2018 **Brown University**, Computer Science Sc.B. w/ Honors, *CS GPA:* 3.94, *Advisors:* Professors George Konidaris & Stefanie Tellex
Thesis: Teaching Robots Using Mixed Reality. [pdf] [video]

Awards and grants

Mar 2022–Present **NSF graduate research fellow**

Sept 2020–Present **Presidential fellow**, Columbia University

May 2022 **CS departmental service award**, Columbia University

May 2018 **Sigma Xi honors society inductee**, Brown University

June 2016 **Undergraduate teaching and research award**, Brown University

Publications and technical reports

(* denotes equal contribution)

Pre-print 2024 *Language models scale reliably with over-training and on downstream tasks.*
S. Y. Gadre, G. Smyrnis, V. Shankar, S. Gururangan, M. Wortsman, R. Shao, J. Mercat, A. Fang, J. Li, S. Keh, R. Xin, M. Nezhurina, I. Vasiljevic, J. Jitsev, A. G. Dimakis, G. Ilharco, S. Song, T. Kollar, Y. Carmon*, A. Dave*, R. Heckel*, N. Muennighoff*, L. Schmidt*. [arXiv] [code]

NeurIPS 2023 (oral) *DataComp: In search of the next generation of multimodal datasets.*
S. Y. Gadre*, G. Ilharco*, A. Fang*, J. Hayase, G. Smyrnis, T. Nguyen,

R. Marten, M. Wortsman, D. Ghosh, J. Zhang, E. Orgad, R. Entezari, G. Daras, S. Pratt, V. Ramanujan, Y. Bitton, K. Marathe, S. Mussmann, R. Vencu, M. Cherti, R. Krishna, P. W. Koh, O. Saukh, A. Ratner, S. Song, H. Hajishirzi, A. Farhadi, R. Beaumont, S. Oh, A. Dimakis, J. Jitsev, Y. Carmon, V. Shankar, L. Schmidt. [arXiv] [website] [code]

NeurIPS 2023 — *Multimodal C4: An open, billion-scale corpus of images interleaved with text.*
W. Zhu*, J. Hessel*, A. Awadalla, **S. Y. Gadre**, J. Dodge, A. Fang, Y. Yu, L. Schmidt, W. Y. Wang, Y. Choi. [arXiv] [code]

NeurIPS 2023 — *Objaverse-XL: A wniverse of 10M+ 3D objects.*
M. Deitke, R. Liu, M. Wallingford, H. Ngo, O. Michel, A. Kusupati, A. Fan, C. Laforte, V. Voleti, **S. Y. Gadre**, E. VanderBilt, A. Kembhavi, C. Vondrick, G. Gkioxari, K. Ehsani, L. Schmidt*, A. Farhadi*. [arXiv] [website] [code]

NeurIPS 2023 — *Improving multimodal datasets with image captioning.*
T. Nguyen, **S. Y. Gadre**, G. Ilharco, S. Oh, L. Schmidt. [arXiv]

Tech Report 2023 — *OpenFlamingo: An open-source framework for training large autoregressive vision-language models.*
A. Awadalla*, I. Gao*, J. Gardner, J. Hessel, Y. Hanafy, W. Zhu, K. Marathe, Y. Bitton, **S. Y. Gadre**, S. Sagawa, J. Jitsev, S. Kornblith, P. W. Koh, G. Ilharco, M. Wortsman, L. Schmidt. [arXiv] [code]

Tech Report 2023 — *OpenLM: a minimal but performative language modeling repository.*
S. Gururangan*, M. Wortsman*, **S. Y. Gadre***, A. Dave*, M. Kilian, W. Shi, J. Mercat, G. Smyrnis, G. Ilharco, M. Jordan, R. Heckel, A. Dimakis, A. Farhadi, V. Shankar*, L. Schmidt. [blog] [code]

IROS 2023 — *Structure From Action: Learning interactions for articulated object 3D structure discovery.*
N. Nie, **S. Y. Gadre**, K. Ehsani, S. Song. [arXiv] [website]

CVPR 2023 — *CoWs on Pasture: Baselines and benchmarks for language-driven zero-shot object navigation.*
S. Y. Gadre, M. Wortsman, G. Ilharco, L. Schmidt, S. Song. [arXiv] [website] [code]

NeurIPS 2022 — *Patching open-vocabulary models by interpolating weights.*
G. Ilharco*, M. Wortsman*, **S. Y. Gadre***, S. Song, H. Hajishirzi, S. Kornblith, A. Farhadi, L. Schmidt. [arXiv] [website] [code]

ICML 2022 — *Model soups: Averaging weights of multiple fine-tuned models improves accuracy without increasing inference time.*
M. Wortsman, G. Illharco, **S. Y. Gadre**, R. Roelofs, R. Gontijo-Lopes, A. S. Morcos, H. Namkoong, A. Farhadi, Y. Carmon*, S. Kornblith*, L. Schmidt*. [arXiv] [code]

CVPR 2022 — *Continuous scene representations for embodied AI.*
S. Y. Gadre, K. Ehsani, S. Song, R. Mottaghi. [arXiv] [website] [code]

ICCV 2021 — *Act the Part: Learning interaction strategies for articulated object part discovery.*
S. Y. Gadre, K. Ehsani, S. Song. [arXiv] [website]

ICRA 2019 — *End-user robot programming using mixed reality.*
S. Y. Gadre, E. Rosen, G. Chien, E. Phillips, S. Tellex, G. Konidaris. [pdf] [video]

Research experience

Sept 2020–Present — **Columbia University**, Graduate researcher
Advisor: Professor Shuran Song
Multimodal computer vision, natural language processing, and robotics.

May–Aug 2022 — **Allen Institute for Artificial Intelligence (AI2)**, Research intern
Advisors: Professor Roozbeh Mottaghi & Dr. Kiana Ehsani
How can open-vocabulary models bridge the simulation to reality gap?

June–Dec 2021 — **Allen Institute for Artificial Intelligence (AI2)**, Research intern
Advisors: Professor Roozbeh Mottaghi & Dr. Kiana Ehsani
Worked on learning scene representations to support a wide range of downstream embodied and vision tasks.

Sept 2017–July 2018 — **Brown University**, Robotics researcher & honors candidate
Advisors: Professors George Konidaris & Stefanie Tellex
Investigated mixed reality interfaces to allow novice users to use holograms to program and teach robots.

May–Aug 2016 — **Brown University**, Computer Vision researcher
Advisor: Professor Benjamin Kimia
Worked on visual odometry and camera pose estimation.

Industry experience

Feb 2019–Aug 2020 — **Microsoft HoloLens**, Software Engineer II
Manager: Dr. Harpreet Sawhney
Worked on object detection and 6DoF object pose estimation for Azure Object Anchors, which I helped to ship.

Teaching experience

Jan–May 2021 — **Robot Learning**, Columbia University, Graduate TA

Sept–Dec 2020 — **Computational Robotics**, Columbia University, Graduate TA

Jan–May 2018 — **Algorithms & Data Structures**, Brown University, TA

Sept–Dec 2016 — **Object Oriented Programming**, Brown University, TA

Invited Talks

April 2024 — **IBM Research, Zurich**
The pre-trainer's toolkit: Dataset construction, model training, & scaling

Oct 2023 — **Data, intelligence, and computation in engineering lab @ NYU**
DataComp: In search of the next generation of multimodal datasets

June 2023 — **CVPR 2023 workshop on 3D scene understanding for vision, graphics, and robotics**
CoWs on Pasture: Baselines and benchmarks for language-driven zero-shot object navigation. [slides] [website]

June 2022 — **CVPR 2022 tutorial on vision-based robot learning.**
No Training? Towards Adapting Zero-Shot Models to Robotics Tasks [slides] [website]

Oct 2018 — **University of Washington robotics colloquium**
Virtual and Mixed Reality Interfaces for Human-Robot Interaction. [website]

Service

July 2020–Present — **Reviewer**, ECCV (2020), CVPR (2023), ICLR (2023), ICML (2022, 2023, 2024), IROS (2022), ICRA (2023), NeurIPS (2023)

April–June 2022 — **CVPR diversity, equity, and inclusion (DEI) committee**, Member
Reviewed CVPR registration fee waivers with an emphasis on improving CVPR's accessibility to underrepresented groups.

Sept–Dec 2021 — **Columbia Pre-submission Application Review (PAR)**, Co-organizer
In charge of outreach efforts with a focus on recruiting underrepresented applicants.

Sept 2020–May 2021 — **Women in Science at Columbia (WiSC)**, Mentor
Met weekly with mentee to provide academic advise and help prepare for internship interviews.

Sept–Dec 2020 — **Columbia Pre-submission Application Review (PAR)**, Reader
Provided comments on statement of purpose materials submitted by students intending to apply for Ph.D. admission.

June–Aug 2020 — **Microsoft HoloLens Intern Co-Mentor**, Research mentor
Provided mentorship for a then incoming Princeton PhD student.

Sept 2014–May 2016 — **Outdoor Leadership and Environmental Education**, Mentor
Mentored 3-5 high school students per year on topics related to college admissions and internships. Taught science workshops and led field trips.

Other interests

In addition to research, I enjoy running, climbing mountains, and singing with my pop/rock choir: Here to Sing.