Josh **Myers-Dean**

Ph.D. Student, University of Colorado Boulder

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Education

August 2021 – Present | **University of Colorado Boulder** | **Colorado, USA**
Ph.D. student in Computer Science

Sept. 2016 – June 2021 | **Western Washington University** | **Washington, USA**
B.S., Computer Science, Minor in Mathematics

Experience

Present – August 2021 | **University of Colorado Boulder | Image and Video Computing Group** [🌐] | **Colorado, USA**
Graduate Research Assistant | Advisor: Dr. Danna Gurari
Developing algorithms to allow users to control the granularity of responses from responses from vision-language models, few-shot learning, and hierarchical segmentation.

August 2023 – May 2023 | **Allen Institute for Artificial Intelligence | PRIOR Team** [🌐] | **Washington, USA**
Research Intern | Mentors: Dr. Favyen Bastani, Dr. Aniruddha Kembhavi
Worked on developing self and unsupervised algorithms for temporal land change detection in remote sensing imagery.

Nov. 2022 – May 2022 | **Adobe Research | Media Intelligence Lab** [🌐] | **Remote, USA**
Research Intern | Mentor: Dr. Brian Price
Developed a novel task of gesture-agnostic, context free interactive segmentation where algorithms only require a marking from a user. Proposed a novel evaluation metric to quantify how much an algorithm improved a previous segmentation.

Sept. 2021 – August 2020 | **Pacific Northwest National Laboratory | Applied Statistics Team** [🌐] | **Remote, USA**
Research Intern | Mentor: Dr. Karl Pazdernik
Analyzed the relationship between ASR results and audio representations to identify poor audio segments for downstream tasks (e.g., speaker diarization). Leveraged zero-shot learning for entity disambiguation.

June 2021 – April 2019 | **Western Washington University | Wehrwein Research Group** [🌐] | **Washington, USA**
Undergraduate Research Assistant | Mentor: Dr. Scott Wehrwein
Used per-pixel features from deep neural networks trained on semantic segmentation to improve lower-level computer vision and image processing tasks such as range masking, seam carving, and graph cuts.

June 2021 – June 2020 | **Western Washington University | Jagodzinski Research Group** [🌐] | **Washington, USA**
Undergraduate Research Assistant | Mentor: Dr. Filip Jagodzinski
Developed a computational software suite, Domain Analysis and Motif Matcher (DAMM), designed to analyze peptide-binding cleft sequence identity in comparison to human PDZ domains.

Publications

S=In Submission, C=Conference, W=Workshop, J=Journal, P=Preprint

[S.1] **Interactive Segmentation for Diverse Gesture Types Without Context**
Josh Myers-Dean, Yifei Fan, Brian Price, Wilson Chan, Danna Gurari
[In Submission]

[C.2] **Computer Vision for International Border Legibility**
Trevor Ortega, Thomas Nelson, Skyler Crane, Josh Myers-Dean, Scott Wehrwein
IEEE Winter Conference on Applications in Computer Vision [**WACV '23**]

[P.1] **Generalized few-shot semantic segmentation: All you need is fine-tuning**
Josh Myers-Dean, Yinan Zhao, Brian Price, Scott Cohen, Danna Gurari
arXiv preprint [**arXiv:2307.10518**]

[C.1] **Towards modeling student engagement with interactive computing textbooks: An empirical study**
David H Smith IV, Qiang Hao, Christopher D Hundhausen, Filip Jagodzinski, Josh Myers-Dean, Kira Jaeger
Proceedings of the 52nd ACM Technical Symposium on Computer Science Education [**SIGCSE '21**]

[J.2] **Domain Analysis and Motif Matcher (DAMM): A Program to Predict Selectivity Determinants in Monosiga brevicollis PDZ Domains Using Human PDZ Data**
Haley A Wofford*, Josh Myers-Dean*, Brandon A Vogel, Kevin Alexander Estrada Alamo, Frederick A Longshore-Neate, Filip Jagodzinski, Jeanine F Amacher (* = Equal Contribution)
Molecules. 2021; 26(19):6034 [**Molecules**]

[W.1] **Semantic Pixel Distances for Image Editing**
Josh Myers-Dean and Scott Wehrwein
New Trends in Image Restoration and Enhancement Workshop at CVPR 2020 [**NTIRE@CVPR '20**]

[J.1] **PETRA: Drug Engineering via Rigidity Analysis**
Sam Herr*, Josh Myers-Dean*, Hunter Read*, Filip Jagodzinski (* = Equal Contribution)
Molecules 25(6):1304 [**Molecules**]

Select Research Projects

Part-Whole Instance Decomposition January '23 - Present
Advisors: Dr. Danna Gurari, Dr. Brian Price

- Benchmarking open and closed vocabulary segmentation models and analyzing their performance on small and thin fashion objects.
- Developing an open-vocabulary part instance segmentation model using soft prompting and transformer adapters. Generating hierarchy-aware captions for Fashion data, which lends itself to a natural hierarchical structure.
- Surveying the commonsense reasoning of instruction-tuned vision-language models as it relates to part-whole relationships (e.g., what is the parent object of a given part?).

Generating Masked Regions of an Image Using a Predicted User Intent May'23 - November'23
Advisors: Dr. Danna Gurari, Dr. Brian Price

- Designed a novel task and accompanying dataset of context-free, gesture-agnostic interactive segmentation in which algorithms do not require the context of an interaction (i.e., add or subtract) and are designed to support multiple gesture types (e.g., scribble, click, lasso). This task has the potential to ease the hidden work placed on creators by allowing them to use the gesture most natural to them during the selection process.
- Developed a novel evaluation metric to holistically evaluate an interactive segmentation under the setting of performing corrections on a previous segmentation.
- Analyzed results from a user study to inform what types of gestures users most frequently used across selection tasks.

Fine-tuning for Few-shot Semantic Segmentation Aug'21 - March'22
Advisors: Dr. Danna Gurari, Dr. Brian Price, Dr. Yinan Zhao

- Developed a simple two-stage fine-tuning approach for generalized few-shot semantic segmentation, outperforming the state-of-the-art meta-learning approach on PASCAL-5^i by 2.46 points in the 1-shot setting, 10.63 points in the 5-shot setting, and 14.42 points in the 10-shot setting.
- Proposed applying triplet loss on the penultimate features of CNNs to redistribute the performance between base and novel categories. Pixels in the semantically rich penultimate feature space that belong to the same class should be pulled together while differing pixels should be pulled apart.

Talks

"Interactive Segmentation"

- Guest Lecture - Graduate Computer Vision, University of Colorado Boulder — May 2023
- [S.1] - BAIVC Student Symposium [🌐] — February 2023

"NLP"

- Giving Context: Entity Classification from a Single Name - PNNL Virtual Research Symposium — August 2021
- Robust Entity Tagging in the Wild: - PNNL Virtual Research Symposium — Dec. 2020

Honors and Awards

Outstanding Service, 2023 CU Boulder Computer Science

Best Work in Progress, 2023 CU Boulder Computer Science

2x Category winner, Overall honorable mention, 2022 Adobe Code Quality Jam

Graduate Research Fellowship Program, 2021 - present National Science Foundation

Early Career Professional Development Fellowship, 2021 CU Boulder Computer Science

James Lee Johnson Memorial Endowment, 2020 WWU Computer Science

1st Place - Biosurveillance Mobile App. Dev. Competition, 2020 PNNL

Outreach

Creative Communities Research Group *Volunteer* May'23 - Present

- Developing and administering computational creative tinkering activities to engage high school aged students in computation.

ITLP K-12 *Curriculum Creator* August'22 - Present

- Design micro:bit activities to engage middle school students in computer science and tinkering.

Teen Science Cafe *Invited Speaker* February'22

- Presented my path to becoming a graduate student and administered activities relating machine learning to web accessibility to high school students in Lafeyette, CO.

Sunnyland Elementary School "Hour of Code" *Facilitator* October'19

- Assisted elementary school students in designing programs using the Scratch programming language.

Software and Open Source Contributions

- **PyDMD**: Tutorial on Compressed Dynamic Mode Decomposition for background modeling *commits*

Academic Service

Reviewer CVPR '23, WACV '24