

MACHINE VISION FOR SCIENCE IMAGES



Dani Ushizima

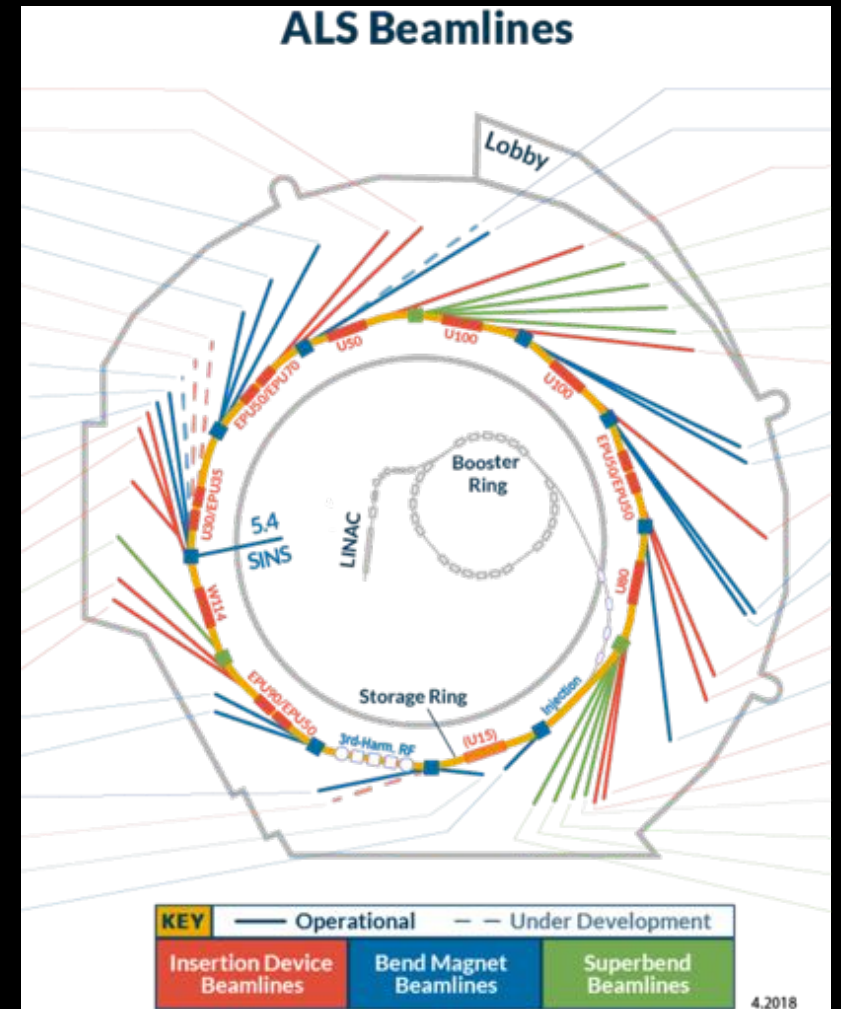
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¹Computational Research Division, LBNL

²Institute of Computational Health Sciences, UC San Francisco

COMPUTATIONAL PHYSICS AT BERKELEY LAB





MACHINE LEARNING AND METROLOGY FOR MATERIALS

Analyze microstructure of materials to advance manufacturing



Ceramic matrix
composites



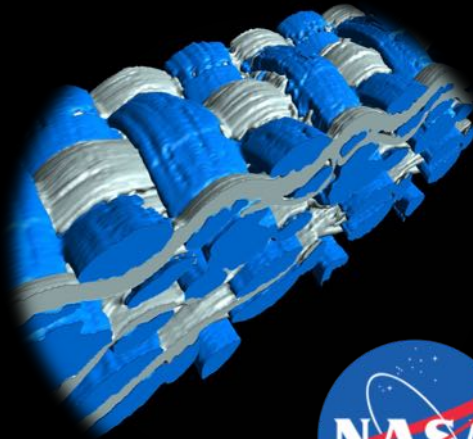
Robert Ritchie



Yan Gao

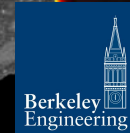
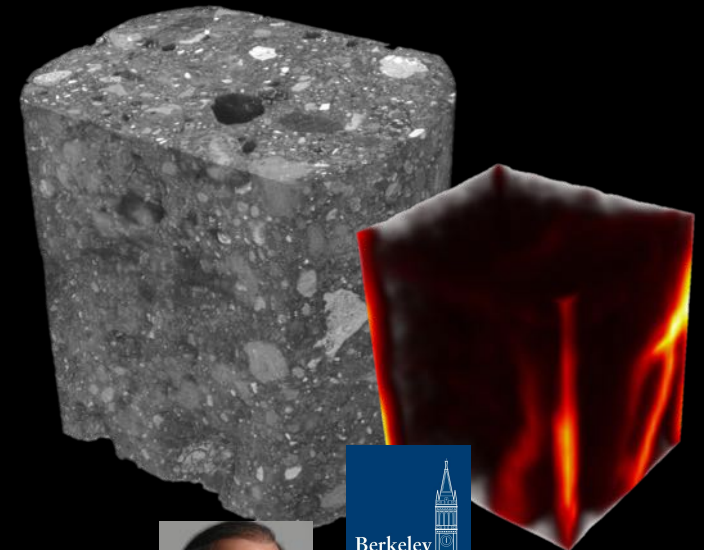


Carbon textiles



Francesco Panerai

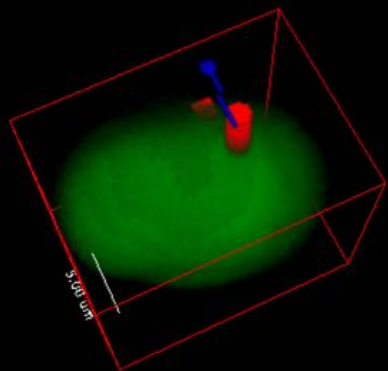
Roman concrete



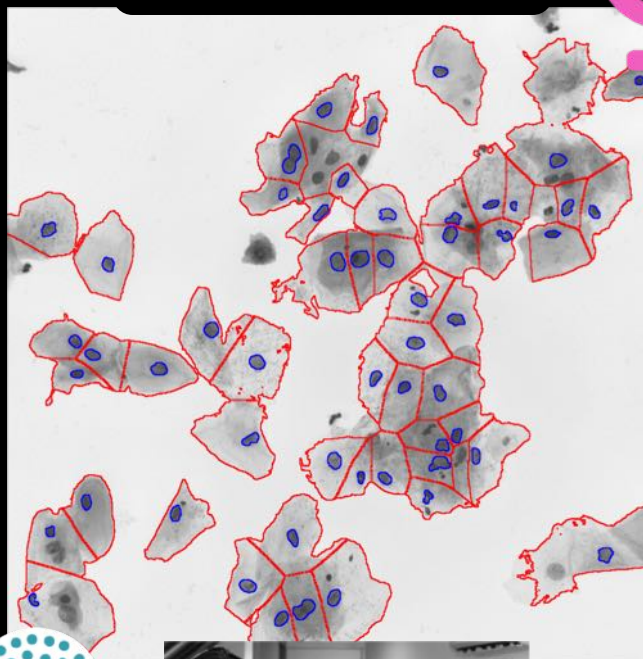
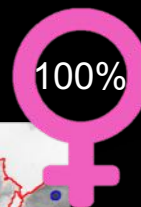
Paulo Monteiro



Breast Cancer



Cervical Cancer



Alzheimer's



Mina Bissel

Kandice Tanner



Claudia
Carneiro



Andrea
Bianchi

Fatma
Medeiros



Lea Grinberg



Maryana Alegro

Caring about women's illnesses

COVID-19 IN LUNGS SCANS



- **Chest X-ray**

- 2D
- Broadly available
- Projection of 3D
- Bones muddle the image

- **Computed tomography**

- 3D
- Restricted availability
- Details at sub-mm scale
- Bones are “erased” digitally



CULTIVATING NEXT GENERATION OF SCIENTISTS

Research and development through collaboration with and support to the next generation of scientists and engineers around the world

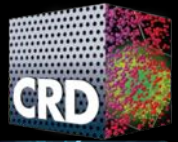


America, Brazil, Cameroon, Canada, China, India, Kenya, Netherlands, Nigeria, South Africa, Thailand, Tunisia, Zimbabwe

ACKNOWLEDGEMENTS



THANK YOU



WHERE ALL STARTED



WEEKEND FUN TIME



BLACK GIRLS CODE

BIDS has supported the BGC **instructors training** by allowing the use of its space for two years in preparation to Robot Expo. Also, BIDS fellows and staff volunteered in benefit of hundreds of girls in the Bay Area.



Train the Trainers



3D printing



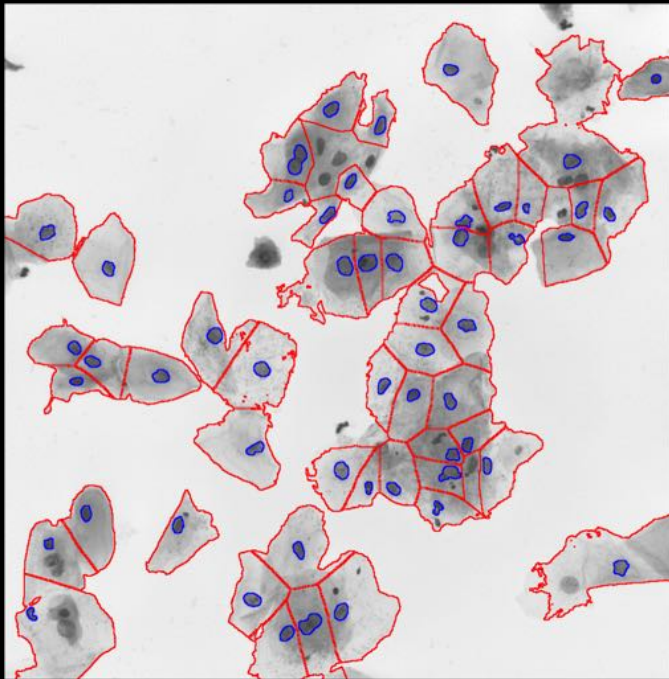
Robot Expo



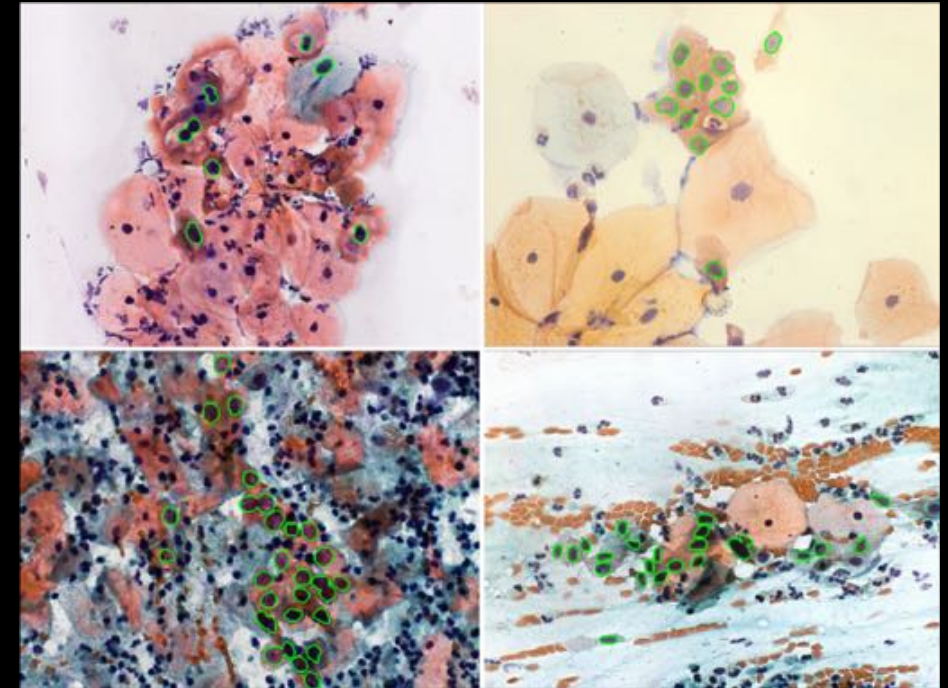
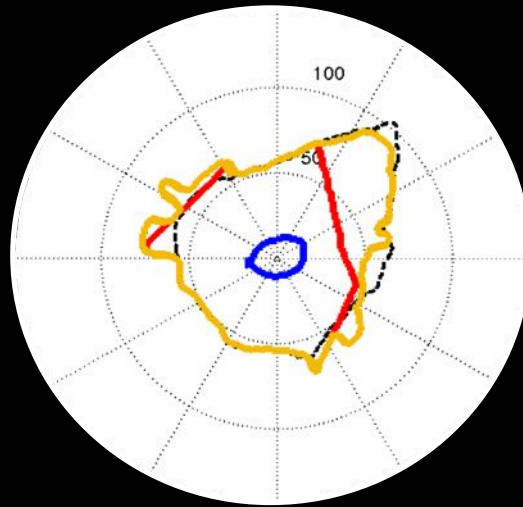
FROM CELL SIMULATIONS TO REAL PAP SMEAR DATA

2013

2020



IEEE ISBI 2014



Deep learning for detection of abnormal cells



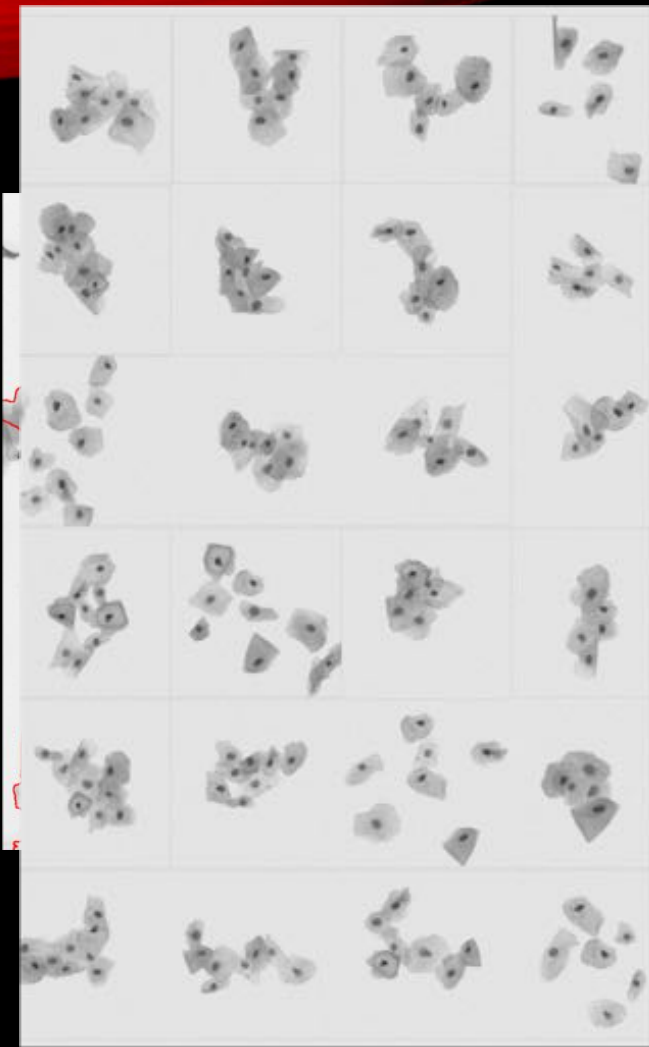
Data Science Fellowship



Machine Learning Research Award



IEEE INT. SYMPOSIUM ON BIOMEDICAL IMAGING 2014
OVERLAPPING CERVICAL CYTOLOGY IMAGE SEGMENTATION CHALLENGE



- Xmas 2013 and 1 month to deliver results;
- Input data:
 - 512x512 pixels, 2+ cells/img with different degrees of overlap, contrast, and texture;
- 961 images:
 - GT: train 45, test: 90 realist
 - Unknowns: 16 real + 810 realistic
- Our algorithm SPVD:
 - computer vision + machine learning.