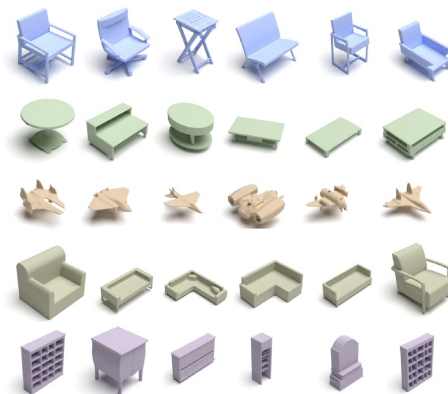
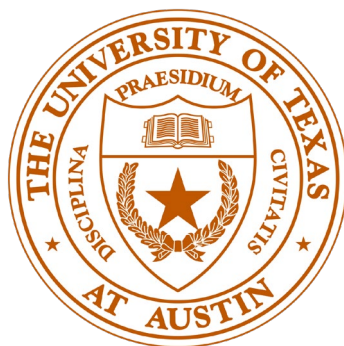
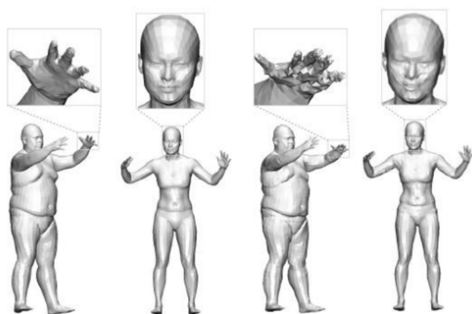


Ind3D: Enforcing Inductive Bias in 3D Generation from Geometric, Physical, Topological, and Functional Perspectives



CVPR 2025 Workshop

6/12/2025

Invited Speakers



Leonidas Guibas
Stanford & Google



David Forsyth
UIUC



Kostas Daniilidis
Upenn



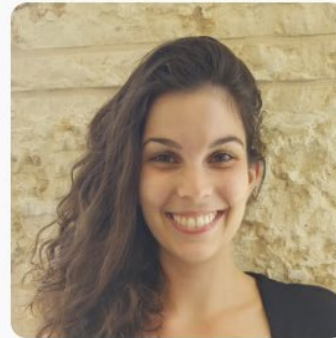
Richard Hao Zhang
SFU



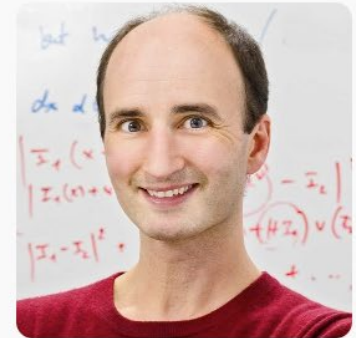
Maks Ovsjanikov
Ecole Polytechnique



Shenlong Wang
UIUC

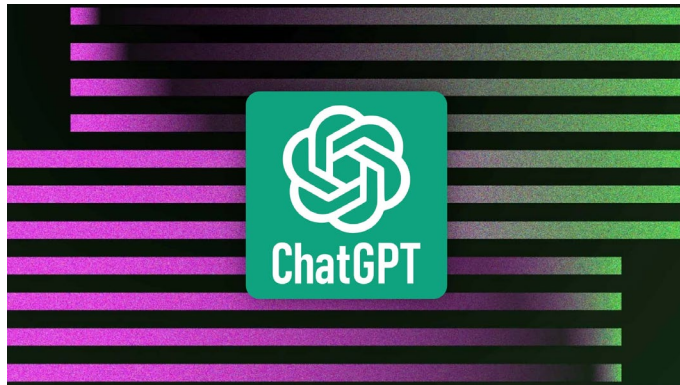


Rana Hanocka
UChicago



Daniel Cremers
TUM

Foundation model era



On the Opportunities and Risks of Foundation Models

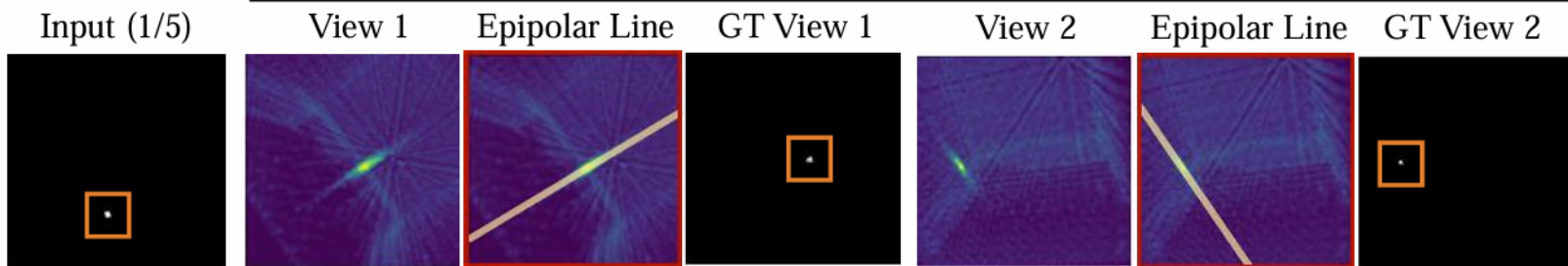
Rishi Bommasani* Drew A. Hudson Ehsan Adeli Russ Altman Simran Arora
Sydney von Arx Michael S. Bernstein Jeannette Bohg Antoine Bosselut Emma Brunskill
Erik Brynjolfsson Shyamal Buch Dallas Card Rodrigo Castellon Niladri Chatterji
Annie Chen Kathleen Creel Jared Quincy Davis Dorottya Demszky Chris Donahue
Moussa Doumbouya Esin Durmus Stefano Ermon John Etchemendy Kavin Ethayarajh
Li Fei-Fei Chelsea Finn Trevor Gale Lauren Gillespie Karan Goel Noah Goodman
Shelby Grossman Neel Guha Tatsunori Hashimoto Peter Henderson John Hewitt
Daniel E. Ho Jenny Hong Kyle Hsu Jing Huang Thomas Icard Saahil Jain
Dan Jurafsky Pratyusha Kalluri Siddharth Karamcheti Geoff Keeling Fereshte Khani
Omar Khattab Pang Wei Koh Mark Krass Ranjay Krishna Rohith Kudithipudi
Ananya Kumar Faisal Ladhak Mina Lee Tony Lee Jure Leskovec Isabelle Levent
Xiang Lisa Li Xuechen Li Tengyu Ma Ali Malik Christopher D. Manning
Suvir Mirchandani Eric Mitchell Zanele Munyikwa Suraj Nair Avanika Narayan
Deepak Narayanan Ben Newman Allen Nie Juan Carlos Niebles Hamed Nilforoshan
Julian Nyarko Giray Ogut Laurel Orr Isabel Papadimitriou Joon Sung Park Chris Piech
Eva Portelance Christopher Potts Aditi Raghunathan Rob Reich Hongyu Ren
Frieda Rong Yusuf Roohani Camilo Ruiz Jack Ryan Christopher Ré Dorsa Sadigh
Shiori Sagawa Keshav Santhanam Andy Shih Krishnan Srinivasan Alex Tamkin
Rohan Taori Armin W. Thomas Florian Tramèr Rose E. Wang William Wang Bohan Wu
Jiajun Wu Yuhuai Wu Sang Michael Xie Michihiro Yasunaga Jiaxuan You Matei Zaharia
Michael Zhang Tianyi Zhang Xikun Zhang Yuhui Zhang Lucia Zheng Kaitlyn Zhou
Percy Liang*¹

Center for Research on Foundation Models (CRFM)
Stanford Institute for Human-Centered Artificial Intelligence (HAI)
Stanford University

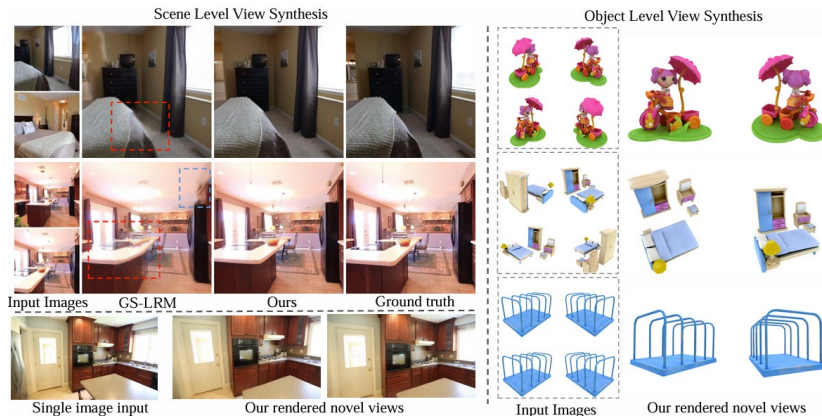
Scaling-up is the Key

Inductive bias is not important

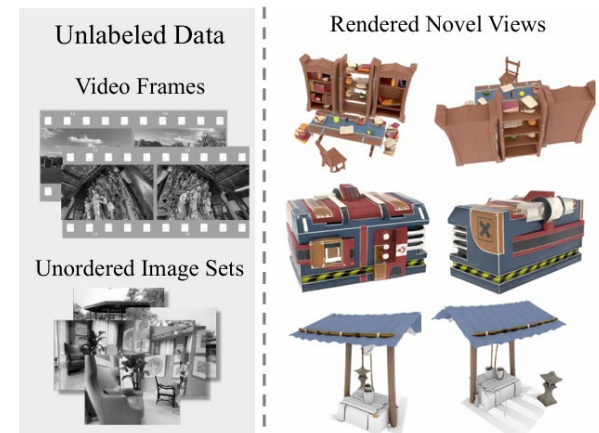
Visualization of Neural Volume at Target Views



LEAP [Jiang et al. 24] shows that Transformers learn epipolar geometry



LVSM [Jin et al. 25]



Rayzer [Jiang et al. 25]

Line structures are not preserved

[Sarkar et al. 24]



Perspective geometry is not preserved

Lack of 3D data



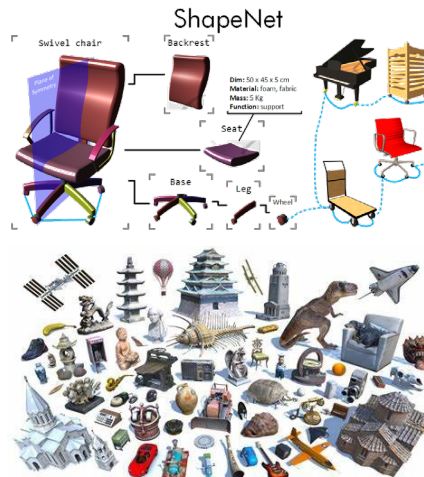
Text

GPT-4 (13T Tokens)



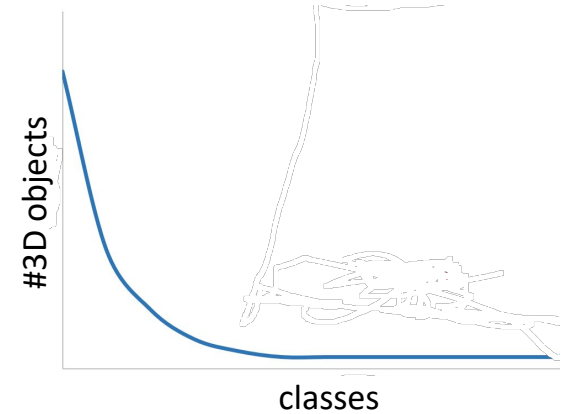
Images

GPT-4v (2T pairs)



3D object

ObjaverseXL (10M)

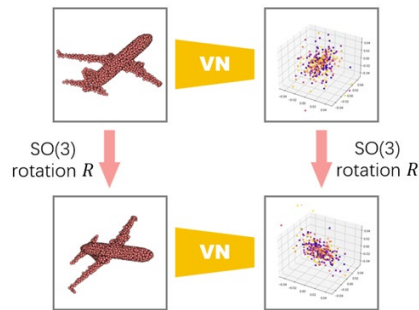


Long-tail distribution

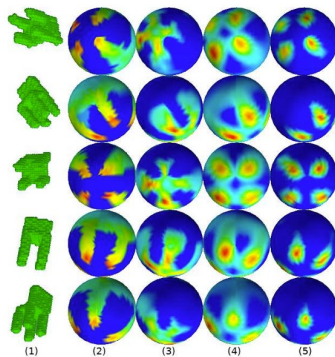
Many 3D inductive biases

- Physical feasibility
- Topological priors (e.g., connected, #holes)
- Geometric priors (e.g., part/deformation structures)
- Function priors (e.g., interactions of humans)

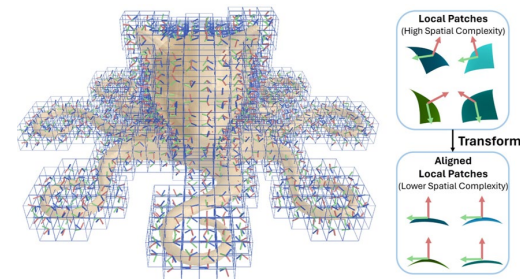
Network Design



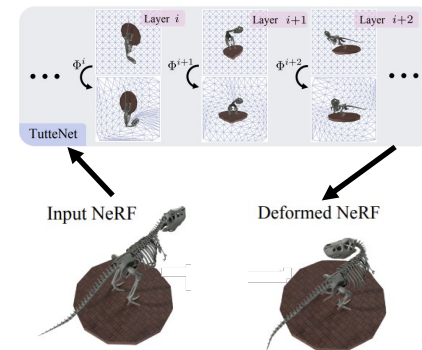
VectorNeuron
[Deng et al., ICCV 21]



Spherical CNNs
[Esteves et al. 18]

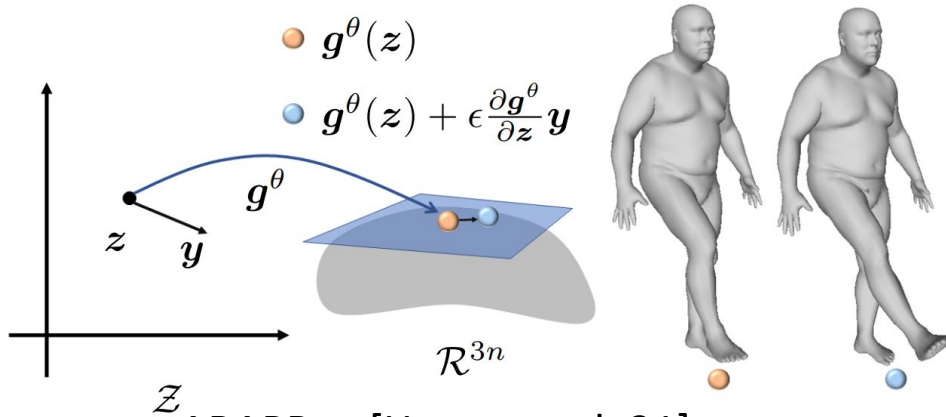


CoFie
[Jiang et al., NeurIPS 24]

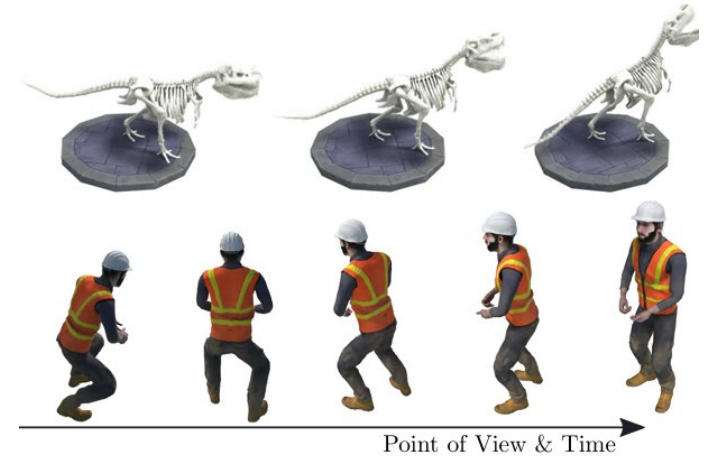


TutteNet
[Sun et al., CVPR 24]

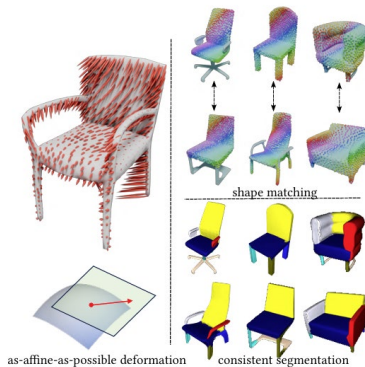
Regularization Losses



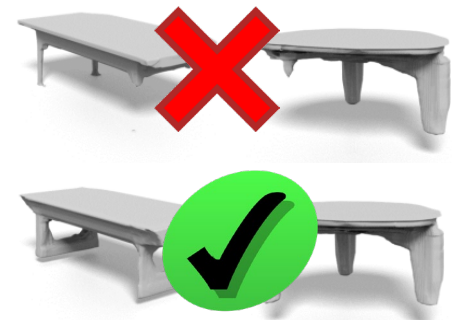
ARAPReg [Huang et al. 21],
GeoLatent [Yang et al. 23]



DNERF [Pumarola1 et al. 20]



GenCorres [Yang et al. 23]
GenAnalysis [Yang et al. 25]



[Mezghanni et al. 21.22]

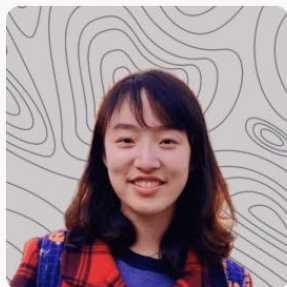
Organizers



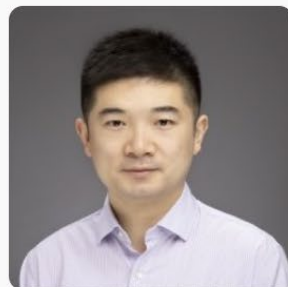
Qixing Huang
UT Austin



Hanwen Jiang
UT Austin



Congyue Deng
Stanford



Lin Gao
UCAS



Biao Zhang
KAUST



Ruqi Huang
Tsinghua SIGS



Anand Bhattad
TTI-Chicago



Roni Sengupta
UNC Chapel Hill



Despoina Paschalidou
NVIDIA



Lingjie Liu
UPenn