GAMES 2018

计算机图形学与混合现实前沿研讨会

最新成果 (Siggraph 2018) 报告1. 1

Numerical Coarsening using Discontinuous Basis Functions

Jiong Chen[1] Hujun Bao[1] Tianyu Wang[1]
Mathieu Desbrun[2] Jin Huang[1]

[1] Zhejiang University
[2] Caltech

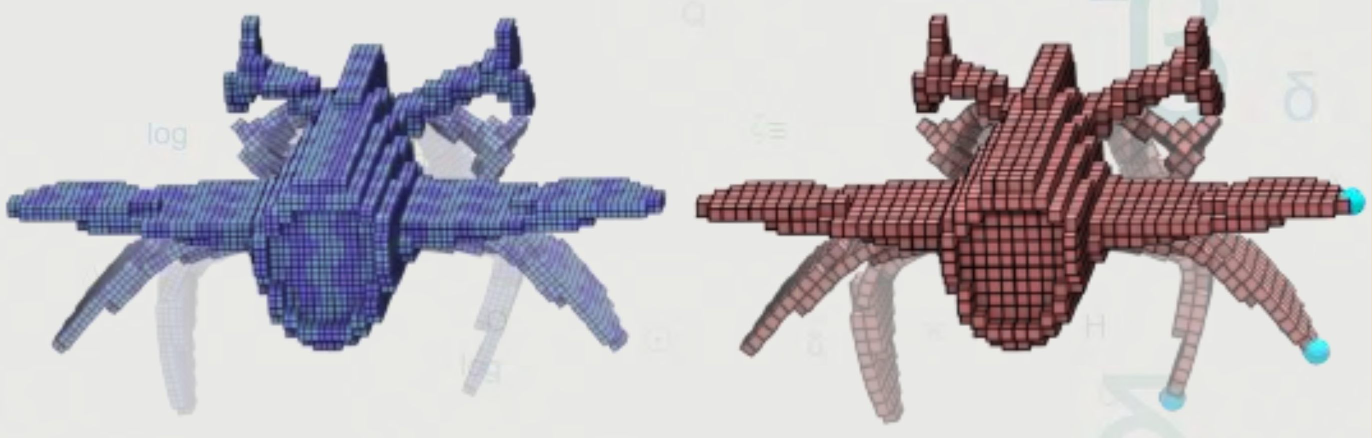
报告时间：2018年5月5日 10:50-11:05
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：浙江大学CAD&CG实验室博士生，主要兴趣是物理模拟。

报告人：陈炯，浙江大学
报告人邮箱：chenjiong1991@126.com

Problem

- **Simulating nonlinear and inhomogeneous elastic deformation with coarse discretization**



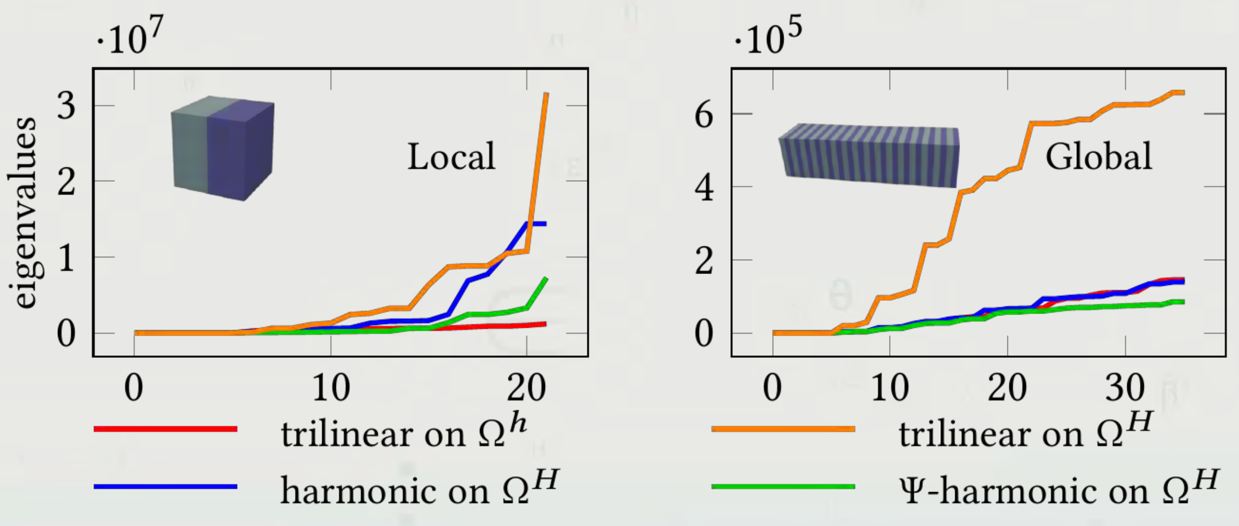
Motivation and challenges

- **Solving nonlinear and inhomogeneous elastic deformation using finely discretized mesh is time demanding**
- **Traditional finite element will suffer serious overstiffening problem**

- **Existing techniques are almost for homogenization of *linear* elasticity**

Basic Idea

- **Do not attempt to homogenize the constitutive model instead try to expand the solution space for coarse simulation**
- **Key idea: optimize shape functions on coarse elements**
  - ***Discontinuous Matrix-valued* shape functions**
  - **Conditions that balance inner-element stiffness and inter-element continuity**

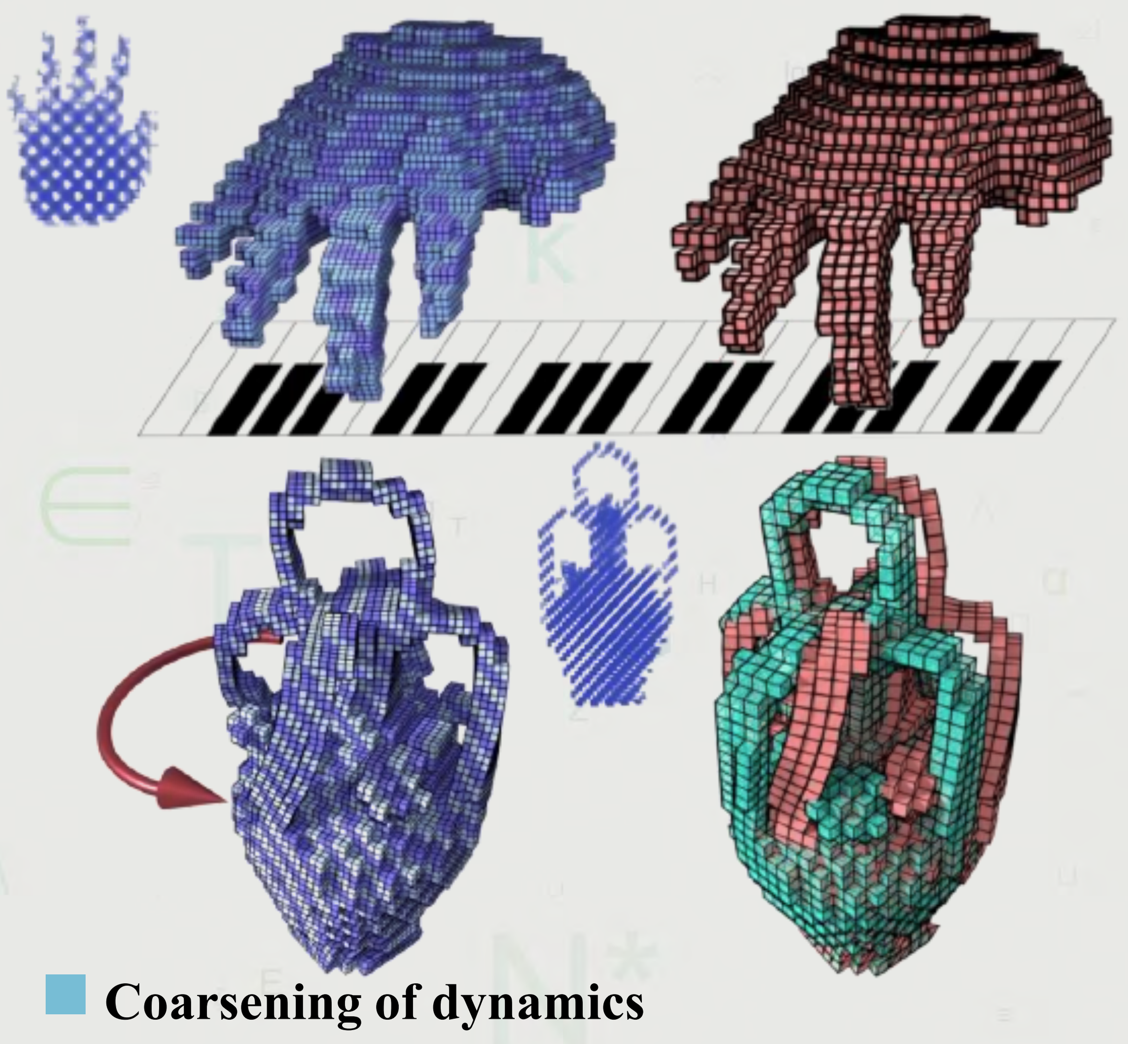


Shape functions optimization

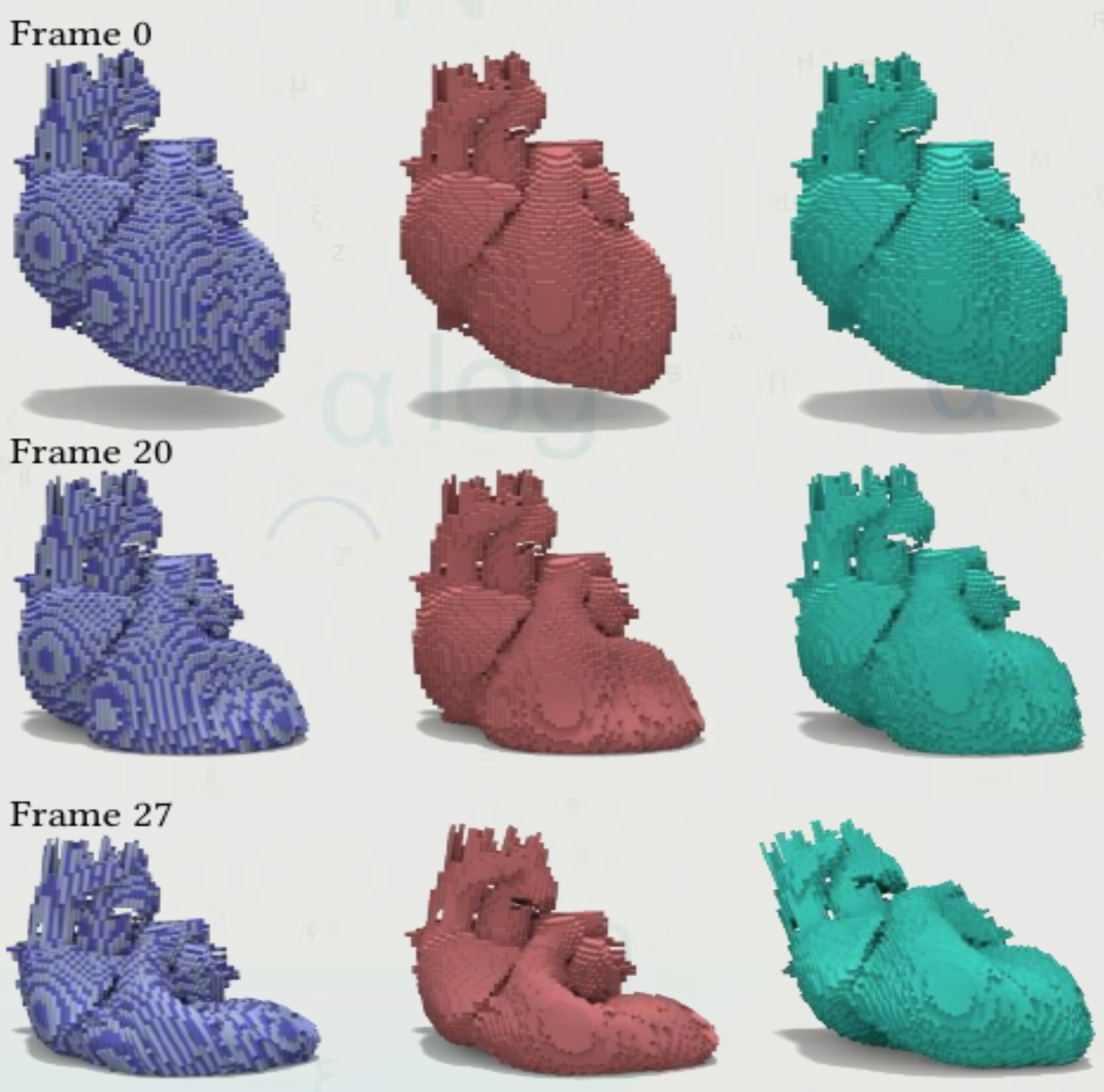
- **Geometric conditions**
  - **Translation invariance, infinitesimal rotation invariance, node interpolation**
- **Physical conditions**
  - **Reconstruct *representative* deformation**
- **Harmonic regularization**

Experiments

- **Coarsening of elastic deformation**



- **Coarsening of dynamics**



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最新成果 (Siggraph 2018) 报告1. 2

Quadrangulation through Morse-Parameterization Hybridization

Xianzhong Fang[1] Hujun Bao[1] Yiying Tong[2] Mathieu Desbrun[3] Jin Huang[1]

[1]Zhejiang University
[2]Michigan State University
[3]California Institute of Technology

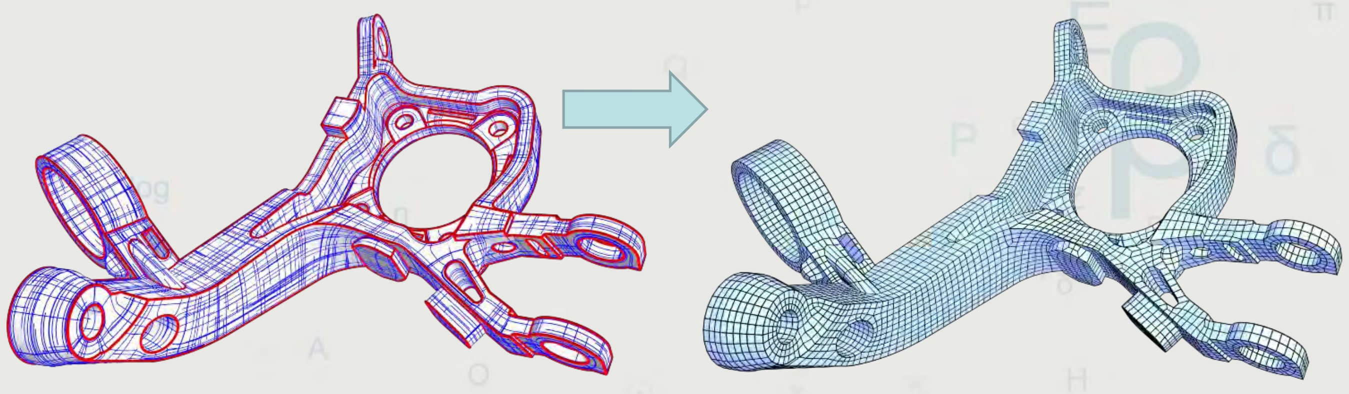
报告时间：2018年5月5日 11:05-11:20
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：浙江大学CAD&CG国家重点实验室博士研究生，主要研究方向为几何处理中的重网格化。

报告人：方贤忠，浙江大学
报告人邮箱：fxzmin@163.com

Problem

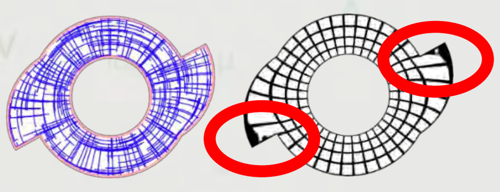
- Automated quadrangulation with features and guiding frame fields



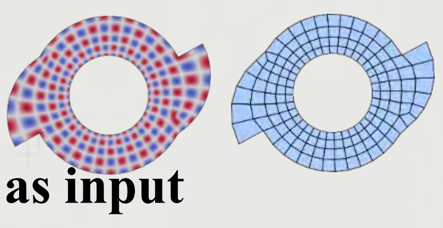
Frame field & Feature　　Quad-mesh

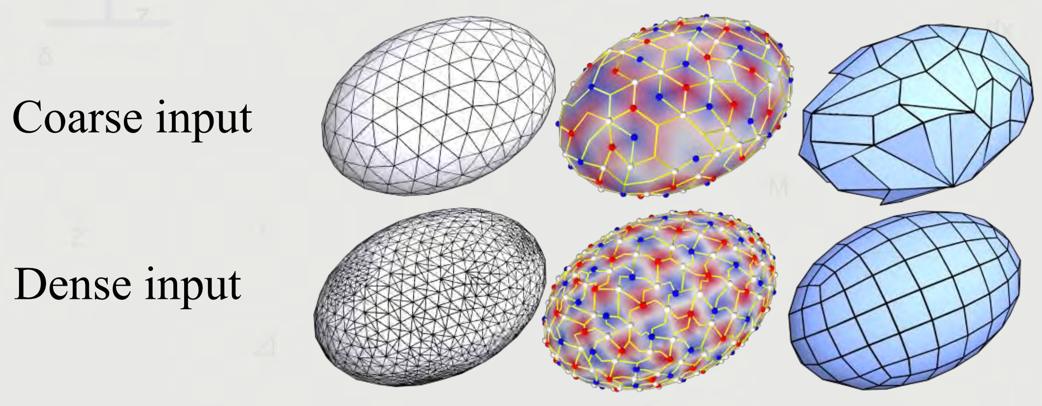
Related works and challenges

- Parameterization-based method
  - Efficiency
  - No guarantee



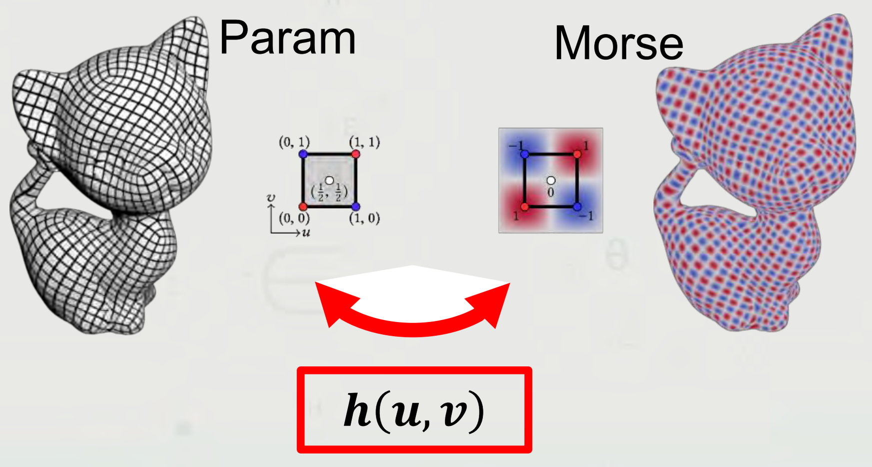
- Morse-based method
  - Guarantee
  - Need dense mesh as input

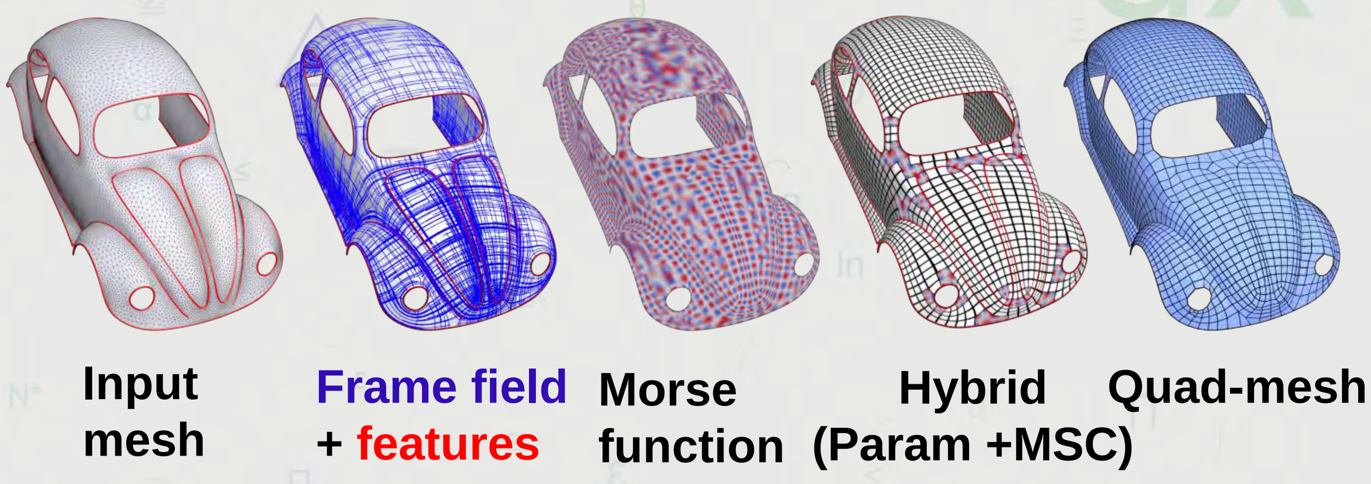




Basic Idea

- Use periodic vector field to connect parametrization- and Morse-based method.
- Extract quads through parametrization and MSC.



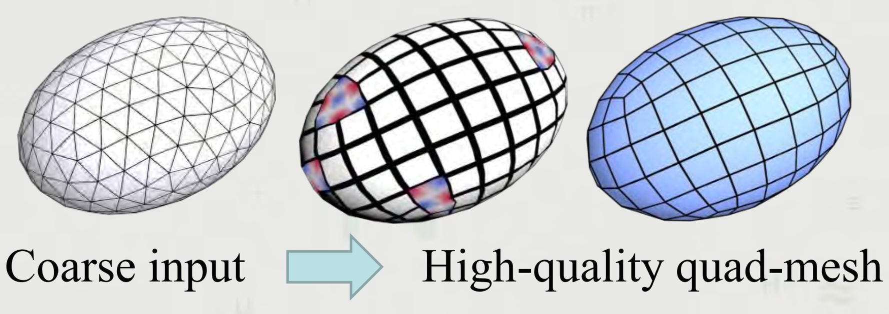


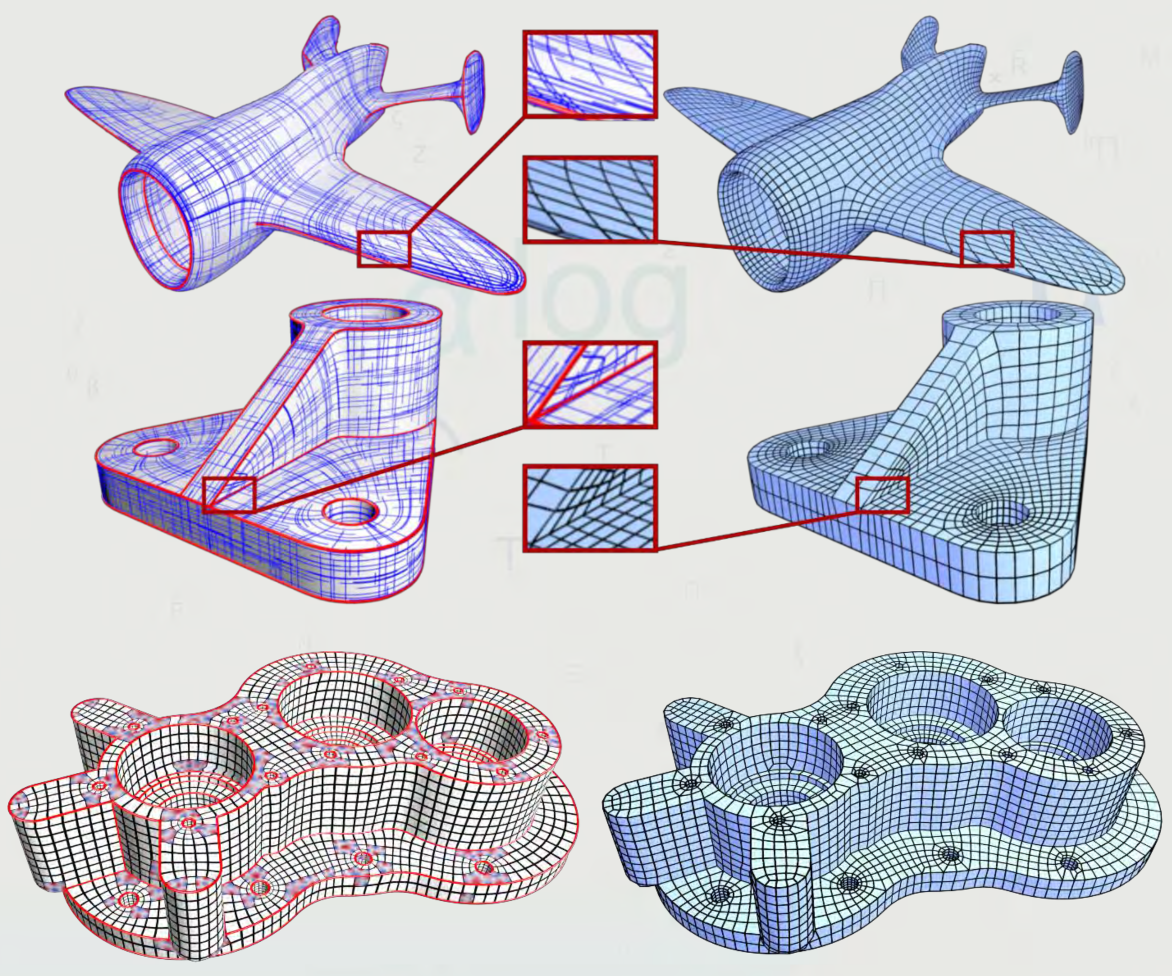
Optimize Periodic vector field

- First solve an eigenvalue problem to get a good initial value by removing nonlinear constraints.
- Perform a classical penalty-based nonlinear optimization through the Gauss-Newton method.

Results

- More efficient than Morse-based method.
- More robust than Parametrization-based method.
- Feature alignment.
- Guided by arbitrary frame field.





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最新成果 (Siggraph 2018) 报告1. 3

DSCarver: Decompose-and-Spiral-Carve for Subtractive Manufacturing

Haisen Zhao[1] Hao (Richard) Zhang[2] Shiqing Xin[1] Yuanmin Deng[1]
Changhe Tu[1] Wenping Wang[3] Daniel Cohen-Or[4] Baoquan Chen[1]

[1]Shandong University
[2]Simon Fraser University
[3]University of Hong Kong
[4]Tel Aviv University

报告时间：2018年5月5日 11:20-11:35
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：山东大学计算机交叉研究中心博士生，师从陈宝权教授。主要研究方向为智能制造相关的计算机图形学，多篇文章发表于SIGGRAPH和Transaction on Graphics上，在软件学报和 Pacific Vis发表论文各一篇。曾荣获"山东大学校长奖学金"，"CAD&CG 2012优秀学生论文"等荣誉。

报告人：赵海森，山东大学
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个人主页：http://irc.cs.sdu.edu.cn/~zhaohaisen/

Problem

Automatic algorithm for subtractive manufacturing of freeform 3D objects using high-speed CNC machining.

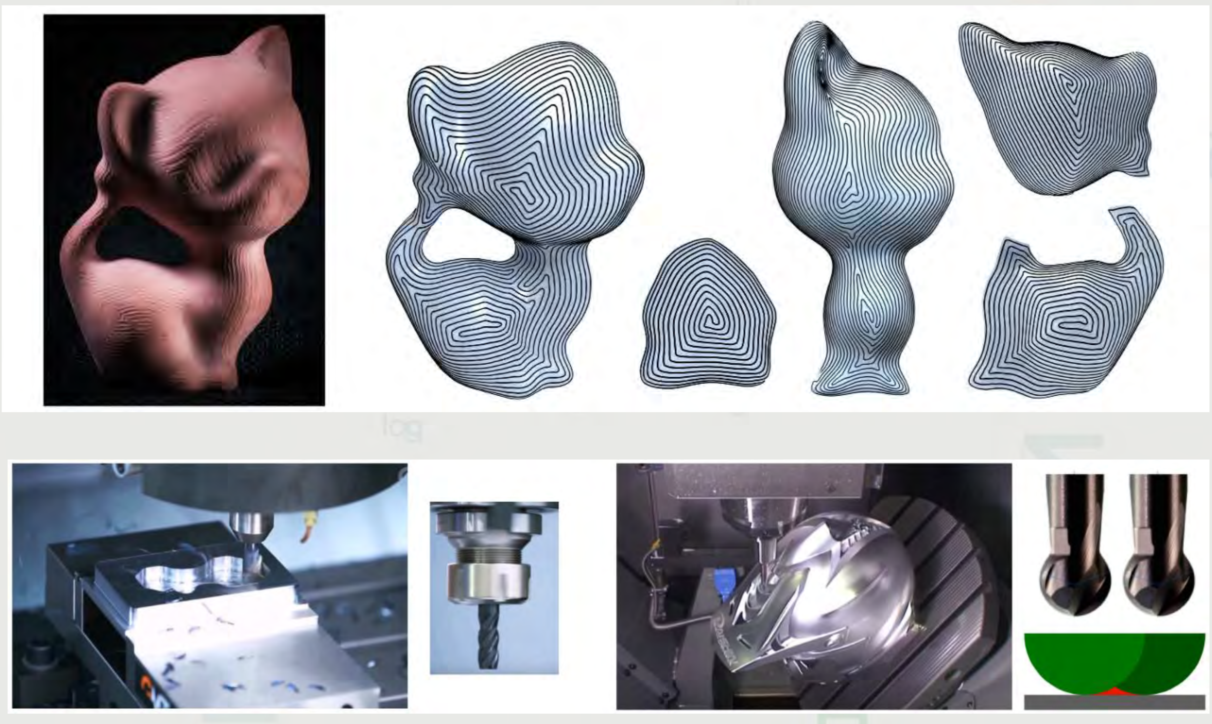

Fig. 2. 3-axis pocket milling (left) with a square cutter vs. 3+2-axis machining (drill on top) with a ball cutter. Scallop (red) is the material residual left between adjacent ball cutter (green) paths.

Main solution

- **Decomposes the input object's surface into a small number of patches each of which is fully accessible and machinable under a fixed drill object setup configuration.**
- **For each patch, compute a continuous, space-filling, and iso-scallop tool path which conforms to the patch boundary, enabling efficient carving with high-quality surface finishing.**
- **The tool path is generated in the form of connected Fermat spirals, which have been generalized from a 2D fill pattern for layered manufacturing to work for curved surfaces.**
- **Furthermore, we develop a novel method to control the spacing of Fermat spirals based on directional surface curvature and adapt the heat method to obtain iso-scallop carving.**

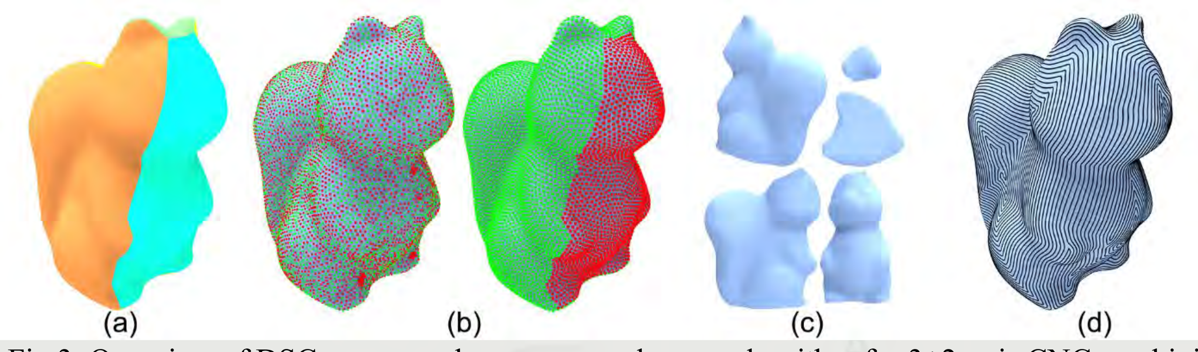

Fig.3. Overview of DSCarver, our decompose-and-carve algorithm for 3+2-axis CNC machining of freeform 3D objects.
(a) Input 3D shape with pre-segmentation into few height fields.
(b) Decomposition into accessible regions (left: with overlaps; right: after boundary extraction).
(c) Integration of accessibility decomposition (b) and height fields (a) into machinable patches.
(d) Connected iso-scallop Fermat spiral paths computed for a few patches.

Experiments and applications

Fig.4. A gallery of surface decomposition results for 3+2-axis machining. For each model in each row, the first two images show the accessible regions obtained after overlap resolution in two different views; the next two images show the final machinable patches obtained in two views.

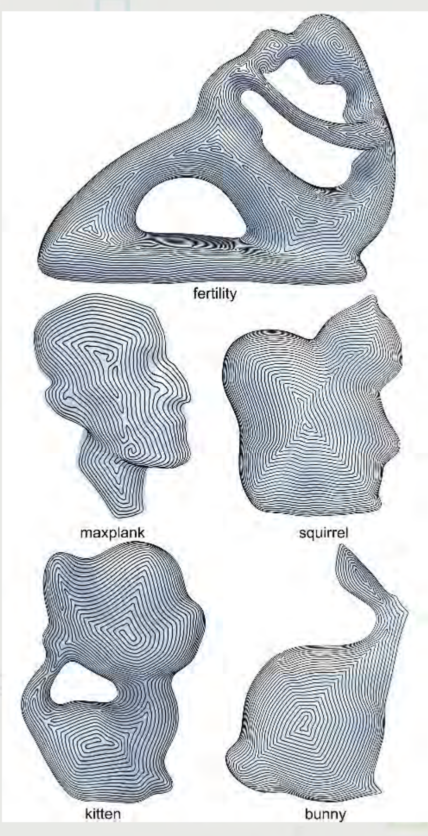

Fig.5. Continuous iso-callop Fermat spirals generated by our method, over patches with diverse geometric characteristics. To ease visualization, we show carving paths obtained at a low resolution.

Patch	#segZ	#segC	#segF	%stZ	%stC	%stF	t_Z	t_C	t_F
#1 (BUNNY)	9	4	1	7.1%	4.7%	**1.5%**	450	368	**342**
#2 (FERTILITY)	18	6	1	6.6%	4.0%	**3.8%**	1908	1054	**1034**
#3 (MAXPLANK)	5	1	1	7.6%	6.0%	**2.5%**	245	232	**205**
#4 (SQUIRREL)	6	1	1	6.0%	2.8%	**1.9%**	539	428	**416**
#5 (KITTEN)	11	2	1	7.4%	3.7%	**2.8%**	469	381	**370**

Table 1. Comparing commericial zigzag (Z) and contour-parallel (C) tool paths to iso-scallop Fermat spirals (F) generated by our method. We report results on patches shown in Figure 14 using the following statistics: number of tool path segments (#segZ,#segC and #segF); percentage of sharp turn points (%stZ,%stC and %stF), and real machining time in seconds (tZ,tC and tF).

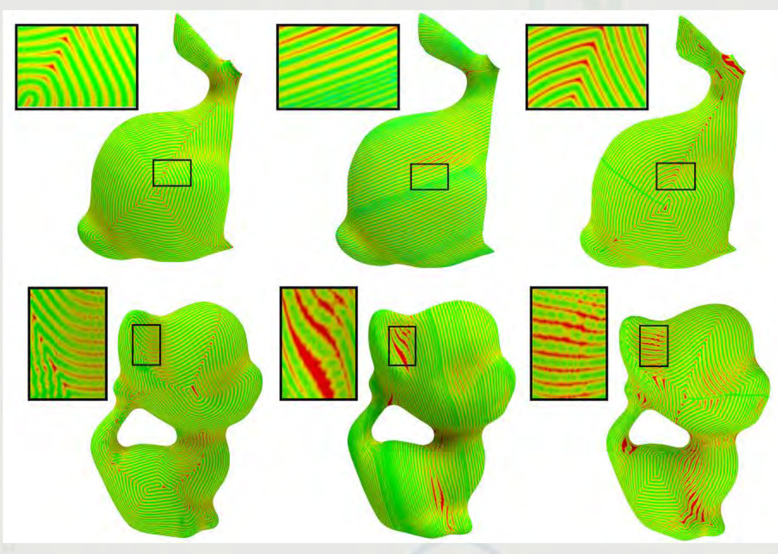

Fig.6. Visualizing scallop heights over several machined patches using our spiral tool paths (left) vs. conventional zigzag paths (middle), and contour-parallel paths (righ). Redish regions indicate higher residual marks.

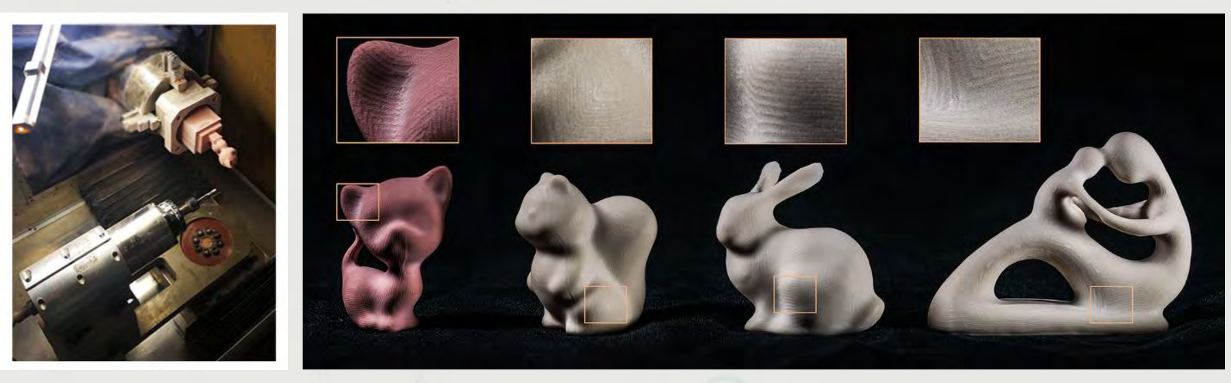

Fig.7. Photographs and close-ups of real machining results for full 3D objects, following setup and tool path planning results obtained by our fully automatic method.

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最新成果 (Siggraph 2018) 报告1.4

Deep Exemplar-based Colorization

Mingming He*[1] Dongdong Chen*[2] Jing Liao[3] Pedro V. Sander[1] Lu Yuan[3]

***Equal contribution. This work was done when they were interns in MSRA.**
[1]Hong Kong University of Science and Technology
[2]University of Science and Technology of China
[3]Microsoft Research Asia

报告时间：2018年5月5日　11:35-11:50
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：微软亚洲研究院视觉计算（visual　computing）组研究员。博士毕业于浙江大学和香港科技大学。研究兴趣包括图像/视频处理，计算摄影学，非真实感渲染，计算机动画等计算机图形学和视觉的相关研究方向。

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报告人邮箱：jliao@microsoft.com
个人主页：liaojing.github.io/html

Problem

Deep learning approach for automatic exemplar-based local colorization

B&W Target　Reference　Colorized Result

Motivation and challenges

A sample reference is useful to guide the realistic colorization:

- **To solve ill-conditioned colorization problem;**
- **To allow users to control the colorization;**
- **To auto-colorize legacy photos and videos.**

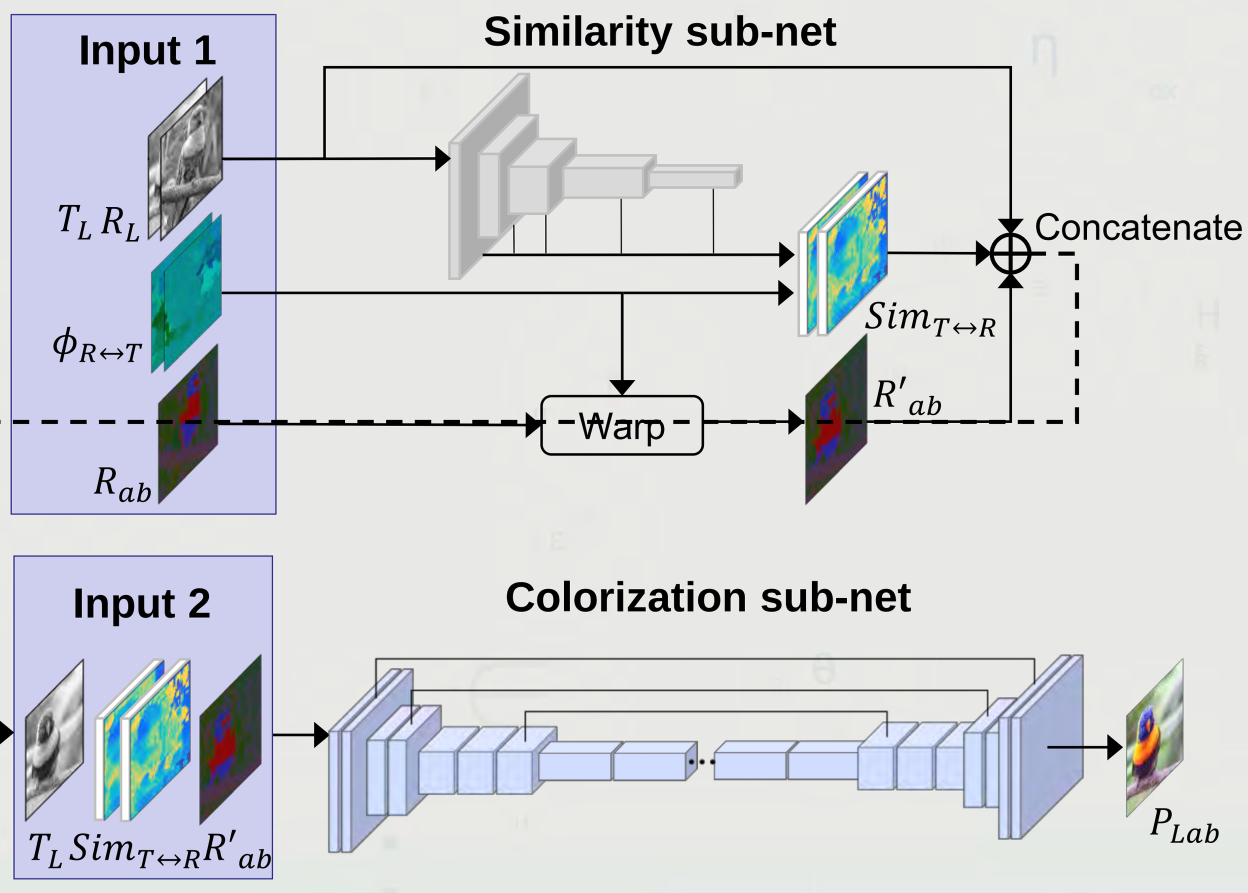
The output colorization is controlled by giving different references:

- **Difficult to learn without ground truth;**
- **Semantically faithful to reference;**
- **Perceptually plausible without proper reference.**

Basic Idea

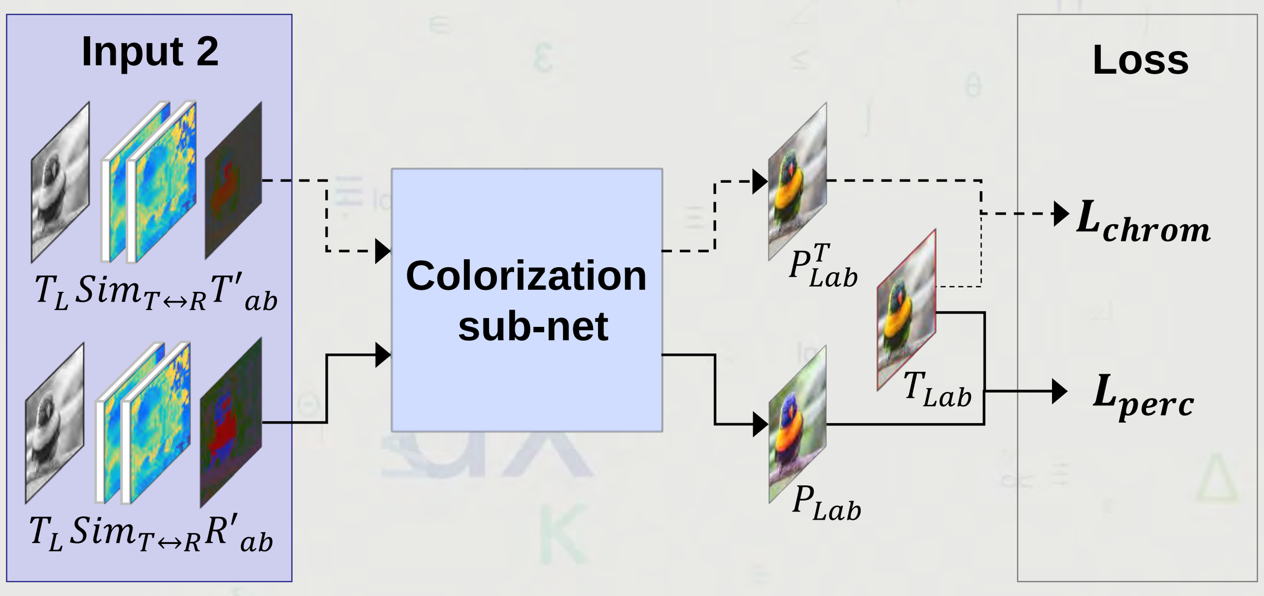
Two novel sub-networks are combined:

- **A pre-process to measure semantic similarity;**
- **An end-to-end colorization network.**



End-to-end Colorization Network: two-branch, multi-task

- ***Chrominance branch:* select and propagate colors based on matching quality**
- ***Perceptual branch:* predict perceptually plausible colors even without a proper reference**

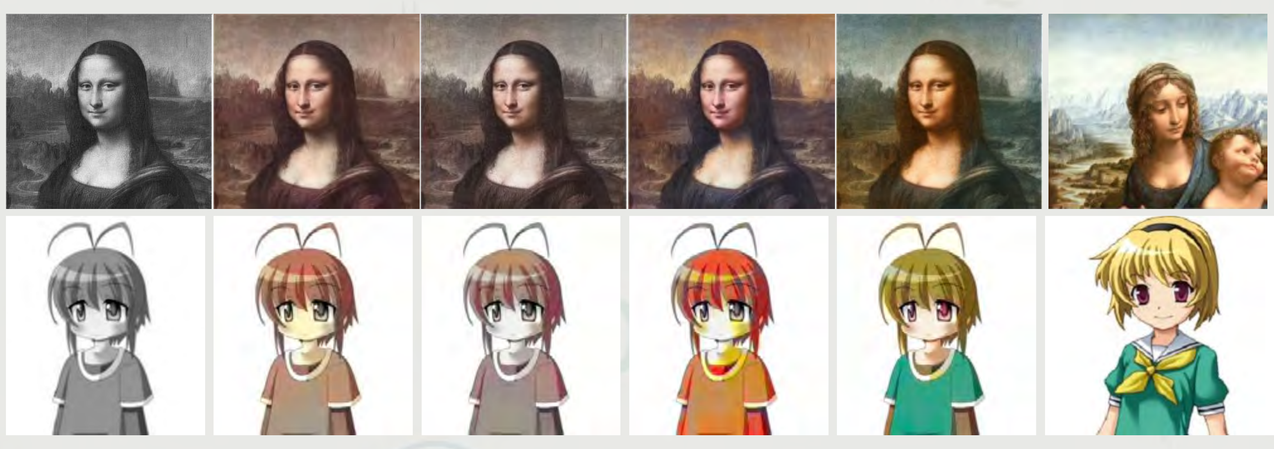


Experiments and applications

- ***Robustness:* robust & faithful to various references**

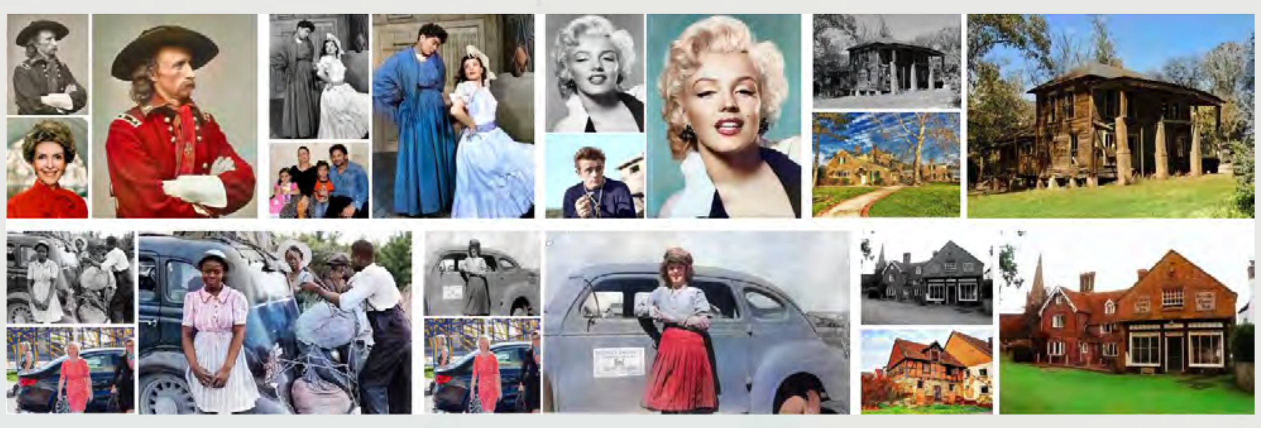
B&W Target　Ref 1/Res 1　Ref 2/Res 2　Ref 3/Res 3

- ***Transferability:* the model trained on ImageNet can process unseen images**



B&W Target　Iizuka2016　Lasson2016　Zhang2016　Ours　Reference

- ***Legacy photo colorization***



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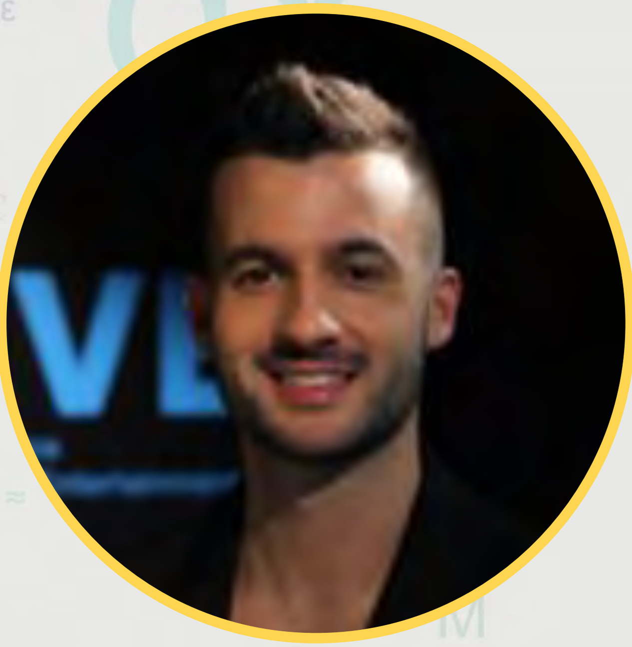
最新成果 (Siggraph 2018) 报告1.5

Neural Best-Buddies: Sparse Cross-Domain Correspondence

Kfir Aberman[1] Jing Liao[2] Mingyi Shi[3] Dani Lischinski[4]
Baoquan Chen[1,3] Daniel Cohen-Or[5]

[1]AICFVE, Beijing Film Academy
[2]Microsoft Research Asia
[3]Shandong University
[4]Hebrew University of Jerusalem
[5]Tel-aviv University



报告时间：2018年5月5日 11:50-12:05
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人：Kfir Aberman，北京电影学院未来影像高精尖创新中心术大学
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报告人简介：Kfir is an Israeli researcher in the advanced innovation center for future visual entertainment (AICFVE) located at the Beijing Film Academy. His areas of interests include deep neural network architectures and their applications in computer graphics. Kfir has experience of several years in computer vision, analyzation of visual data and visual effects as an algorithm team leader in the Israeli defense Intelligence (IDI). Kfir holds a B.Sc. (summa cum laude) and M.Sc. (cum laude) in electrical engineering from the Technion and is pursuing his PhD in Tel-Aviv University.

Problem

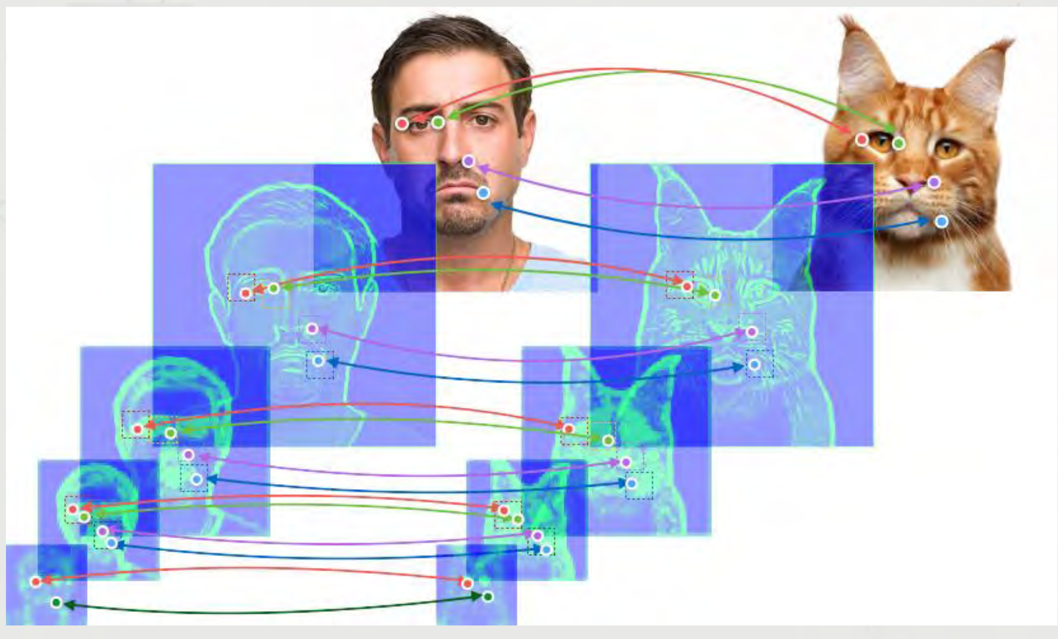
- Sparse cross-domain correspondence:

Motivation and challenges

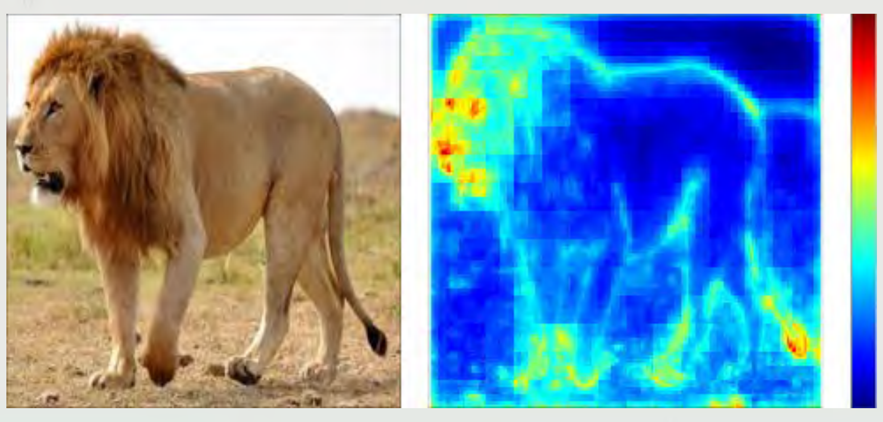
- Cross Categories pairs of images
  - Large difference in appearance,
  - Selection of key-points,
  - Semantic correspondence,
  - Precise Localization,
  - Ambiguous correspondences

Basic Idea

- Features of pretrained deep classification network.
- Mutual nearest neighbors, best-buddies,
- Propagate the semantic correspondence in the deep layers into the image pixels, in a coarse to fine manner.



- Exploiting all-layers features activations to identify semantically important key-points



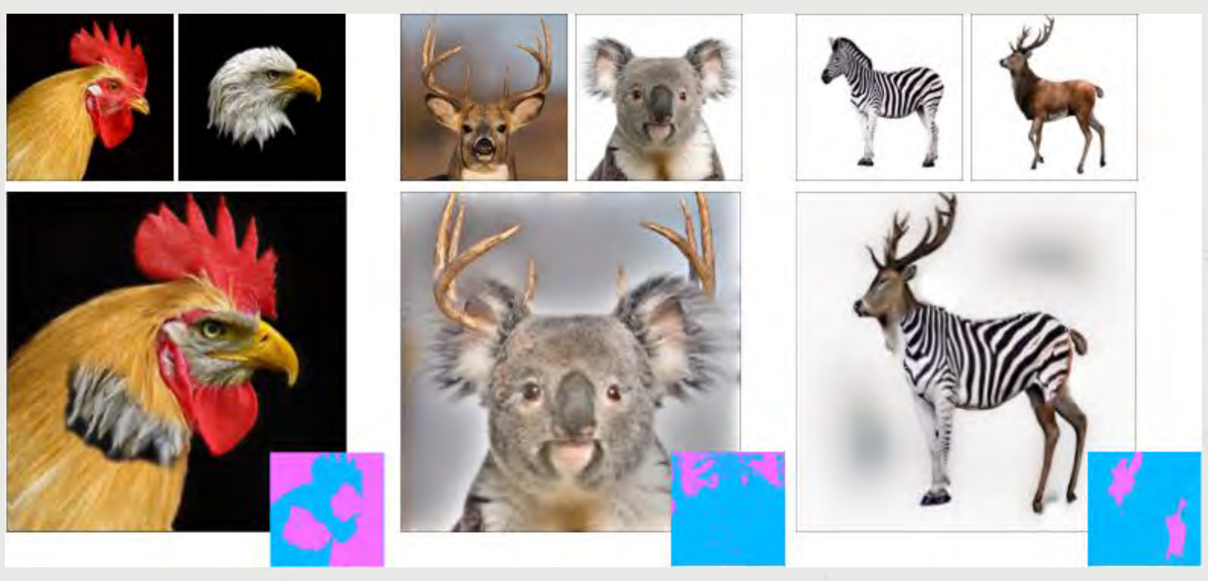
Algorithm:

- Coarse-to-fine reconstruction, for every level:
  - Search best-buddies of deep features patches
  - Filter the pairs of features based on activations
  - Refine the search regions based on the filtered pairs
  - Transfer similar search regions to common middle appearance
- Extract k high-quality spatially scattered key-points

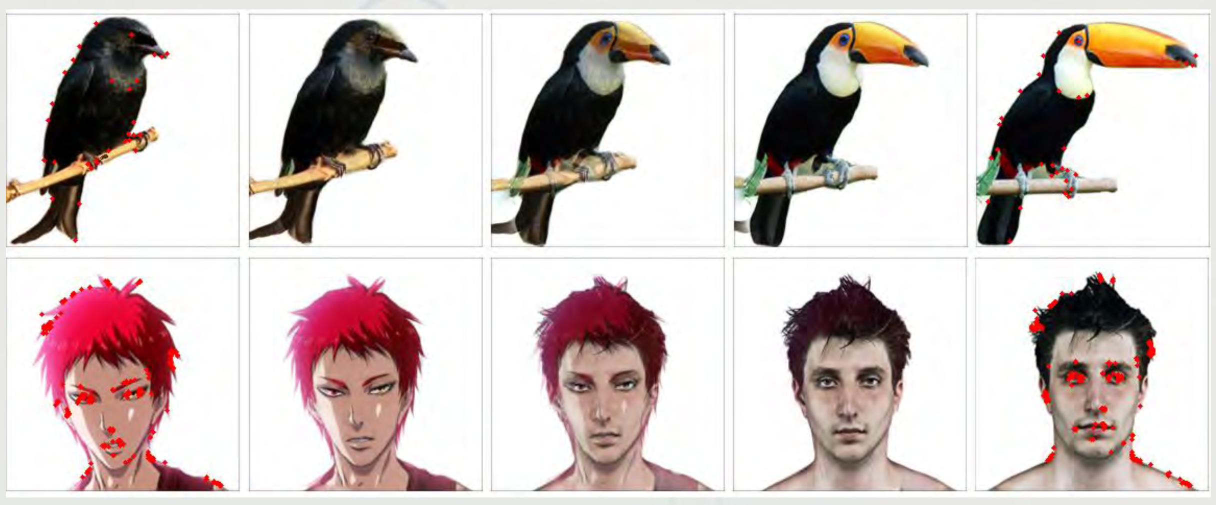
Experiments and applications

- Pose Robustness

- Semantic Image Hybridization



- Automatic Image Morphing



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最新成果 (Siggraph 2018) 报告2. 1

Fluid Directed Rigid Body Control using Deep Reinforcement Learning

Pingchuan Ma[1] Yunsheng Tian[1] Zherong Pan[2] Bo Ren[1] Dinesh Manocha[3]

[1]Nankai University
[2]University of North Carolina at Chapel Hill
[3]University of Maryland at College Park

报告时间：2018年5月5日 17:00-17:15
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人：任博，南开大学
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报告人简介：任博于2015年于清华大学计算机科学与技术系获得工学博士学位。2015年7月至今于南开大学计算机科学与信息安全系担任讲师职位。主要研究领域与兴趣为计算机图形学中的真实感模拟、渲染方向，以及三维模型处理方向。 近年来在图形学领域国际顶级会议SIGGRAPH，顶级杂志Transactions on Graphics(TOG)等处发表文章多篇，其中在基于物理的流体模拟、渲染方向的研究获得了国际上的广泛引用与认可。目前开展的研究项目涉及三维流体模拟，真实感渲染，三维重建与几何模型处理等。

Problem

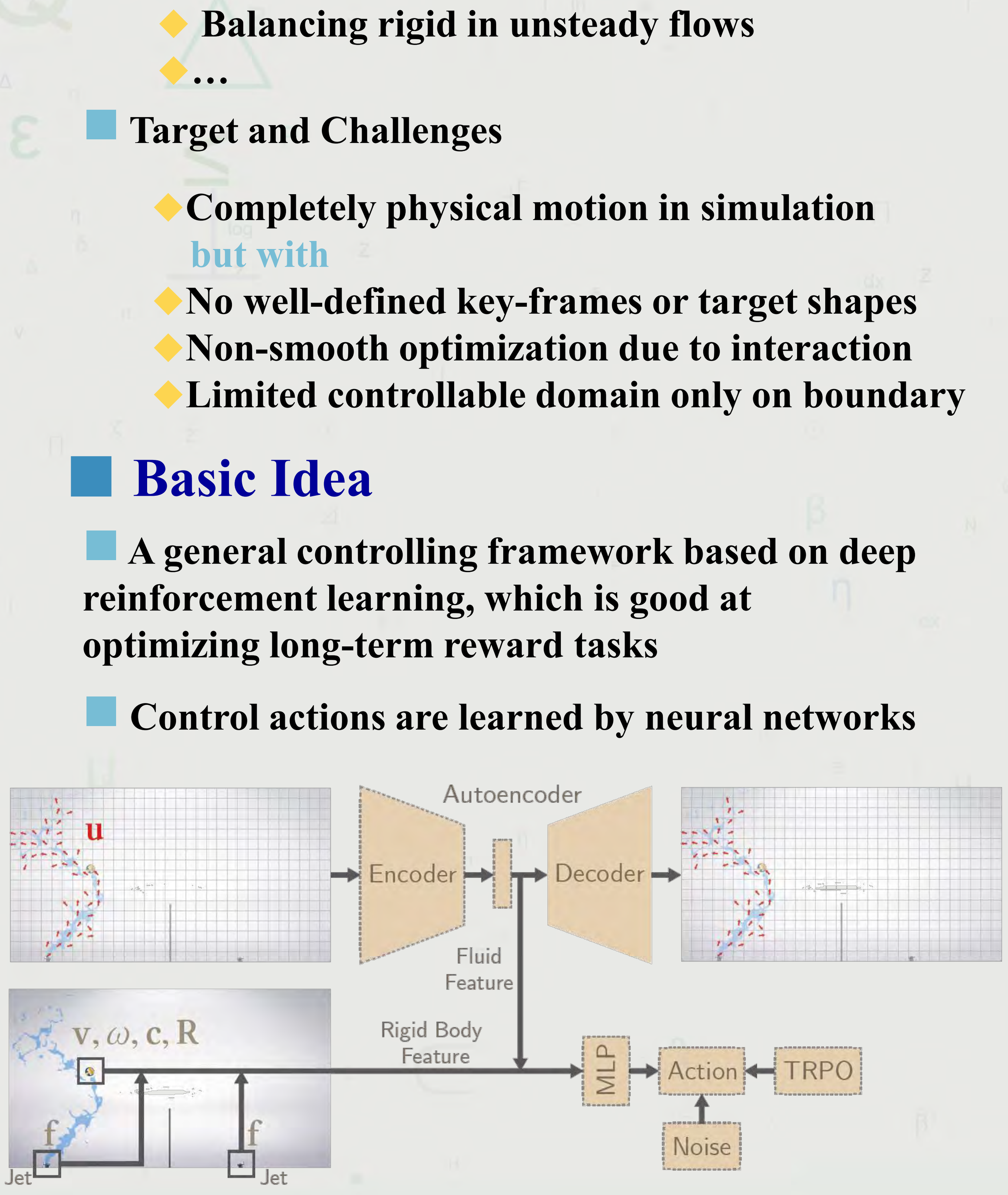
- **Boundary-condition-induced control**
  Control actions only applied on scene boundary

Motivation and challenges

- **Controlling problems based on fluid/rigid interactions in movie and gaming AI industries**
  - **Boat motion control by sea current**
  - **Volleyball games played through water jets**
  - **Balancing rigid in unsteady flows**
  - **…**
- **Target and Challenges**
  - **Completely physical motion in simulation**
    but with
  - **No well-defined key-frames or target shapes**
  - **Non-smooth optimization due to interaction**
  - **Limited controllable domain only on boundary**

Basic Idea

- **A general controlling framework based on deep reinforcement learning, which is good at optimizing long-term reward tasks**
- **Control actions are learned by neural networks**

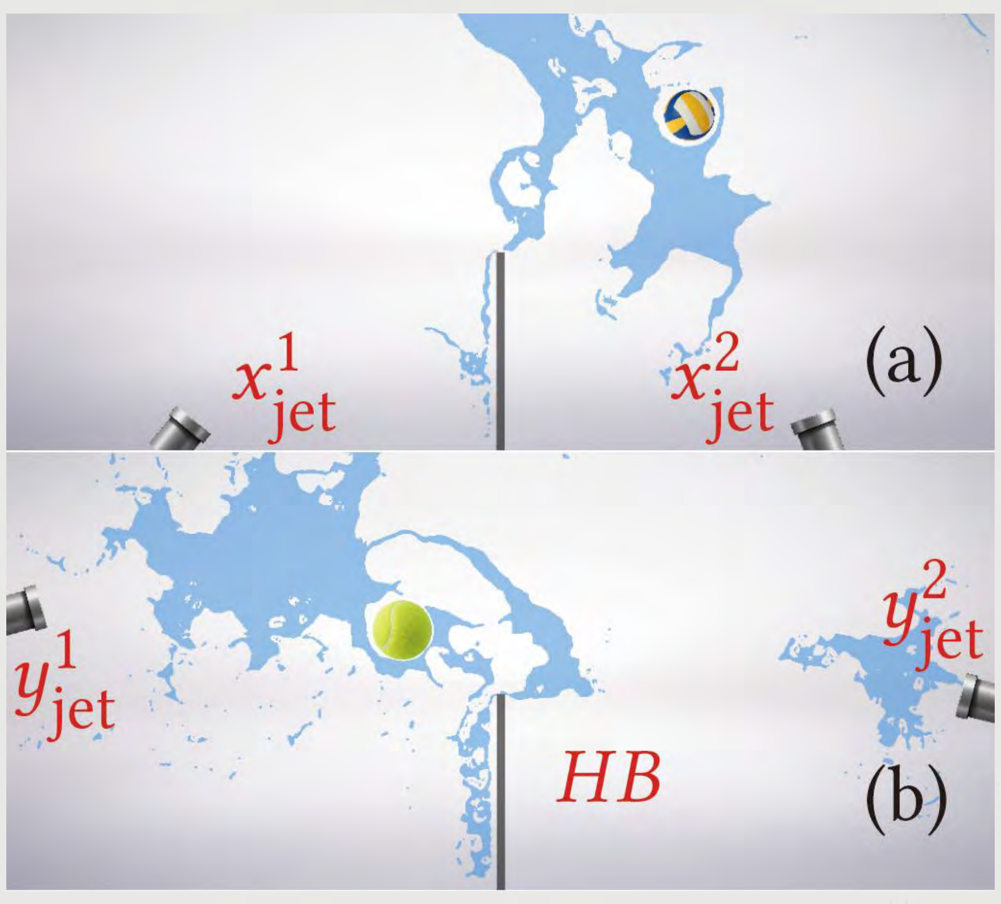


Training of the Network

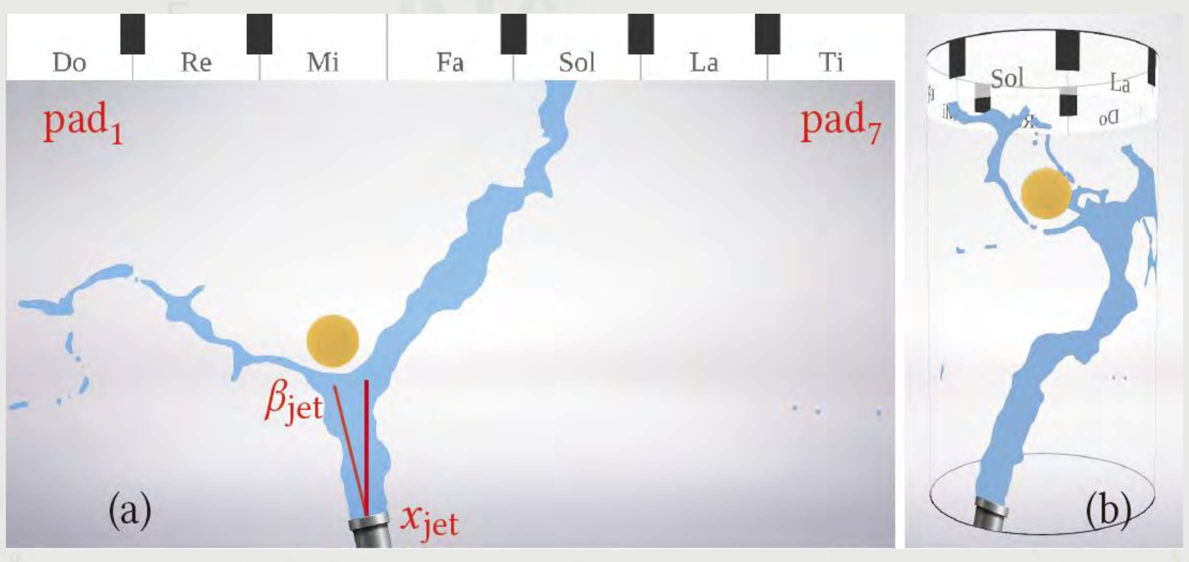
- **An autoencoder network extracting flow features**
- **A multilayer perceptron (MLP) to get the action**
- **TRPO algorithm is used to simultaneously optimize the network parameters in end-to-end manner**

Experiments and applications

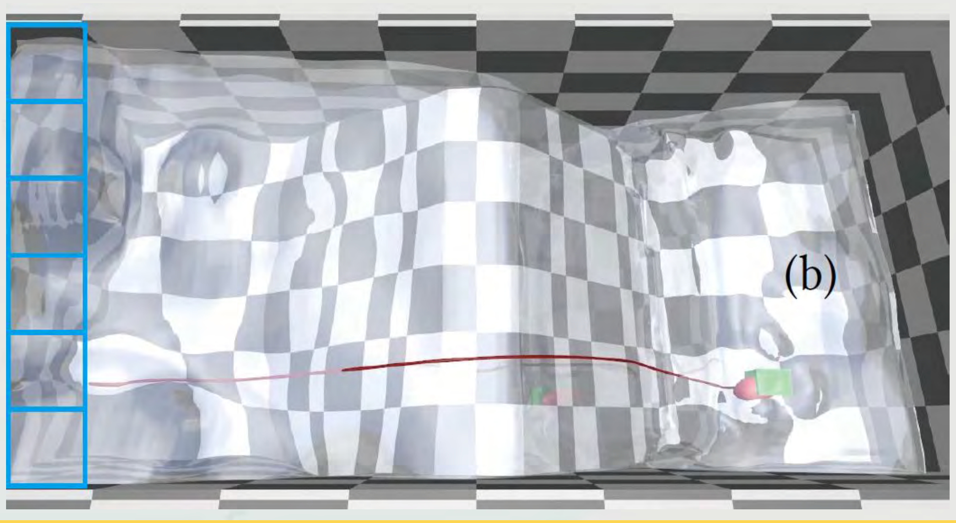
- **Ball Games played by AI-controlled jets**



- **Music Player**



- **Shallow water Controller**



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最新成果 (Siggraph 2018) 报告2. 2

Anderson Acceleration for Geometry Optimization and Physics Simulation

Yue Peng[1] Bailin Deng[2] Juyong Zhang[1] Fanyu Geng[1] Wenjie Qin[1] Ligang Liu[1]

[1]University of Science and Technology of China
[2]Cardiff University

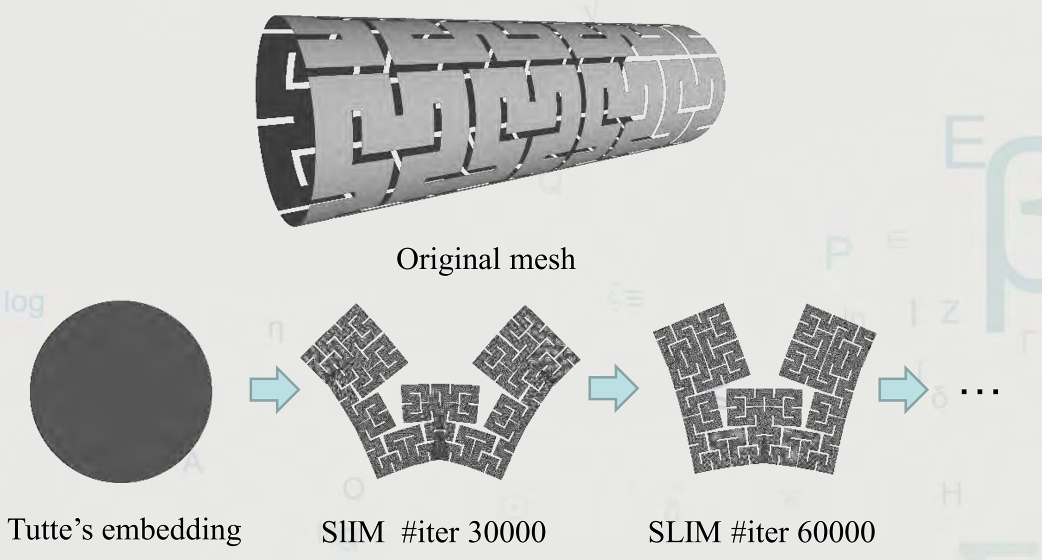
报告时间：2018年5月5日 17:15-17:30
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：张举勇，中国科学技术大学副教授。2006 年于中科大计算机系获得学士学位，2011 年于新加坡南洋理工大学计算机工程学院获得博士学位，2011 年至2012 年于瑞士洛桑联邦理工学院从事博士后研究，2012 年至今工作于中国科学技术大学数学科学学院。研究兴趣包括计算机图形学、计算机视觉、最优化算法等。现担任The Visual Computer期刊编委。

报告人：张举勇，中国科学技术大学
报告人邮箱：juyong@ustc.edu.cn
个人主页：staff.ustc.edu.cn/~juyong

Problem

- **The convergence of local-global solver is slow**



Motivation and challenges

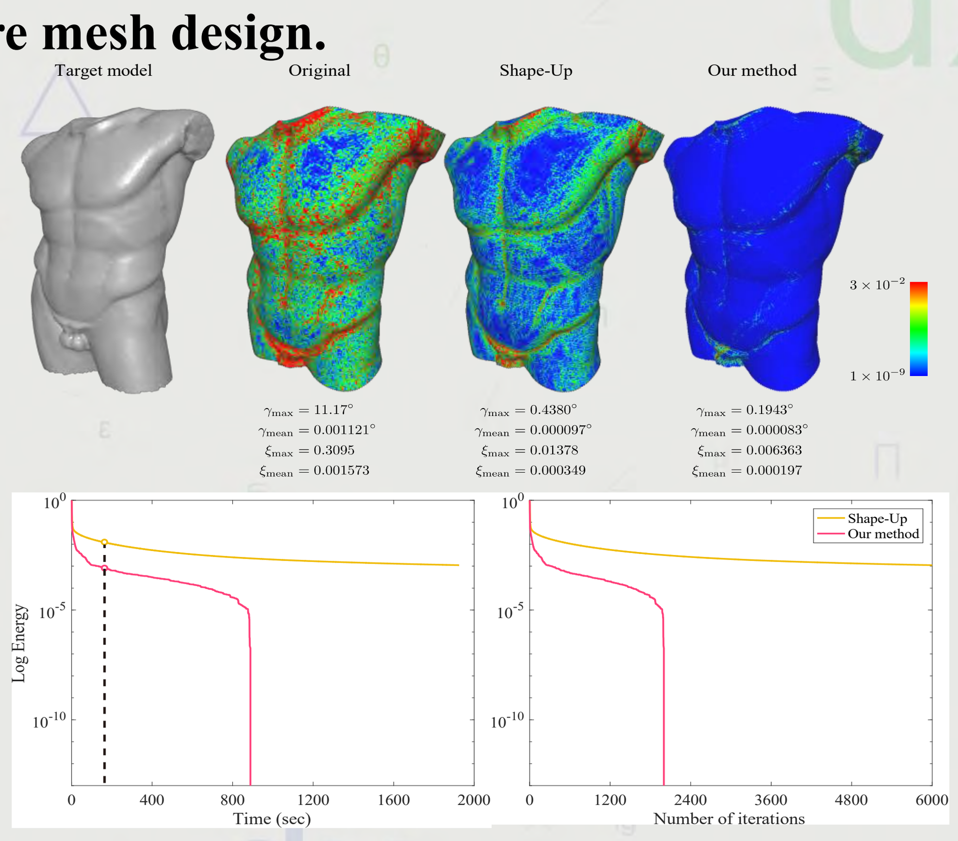
- **Adapt Anderson acceleration to speed up the convergence of local-global solvers for :**
  - **Geometry optimization,**
  - **Physics simulation,**
  - **Centroidal Voronoi tessellation (CVT),**
  - **Any other solvers satisfying loose conditions**
- **Propose a simple and effective strategy to guarantee the global convergence for**
  - **Instability of classical Anderson acceleration.**
- **Analyze the relationship between Anderson acceleration and other quasi-Newton methods.**

Key Idea

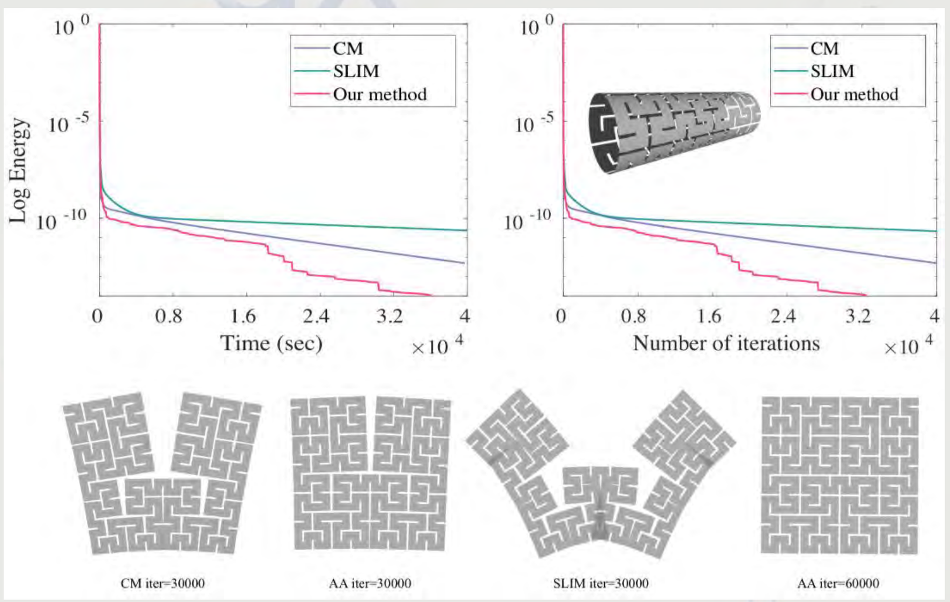
- **Combine local step and global step into a fixed-point iteration.**
- **Apply Anderson acceleration to speed up the convergence.**
- **Guarantee the monotonic of target energy to improve stability of classical Anderson acceleration.**
- **Apply this method on a wide range of application including geometry optimization, physics simulation and centroidal voronoi tessellation**

Experiments and applications

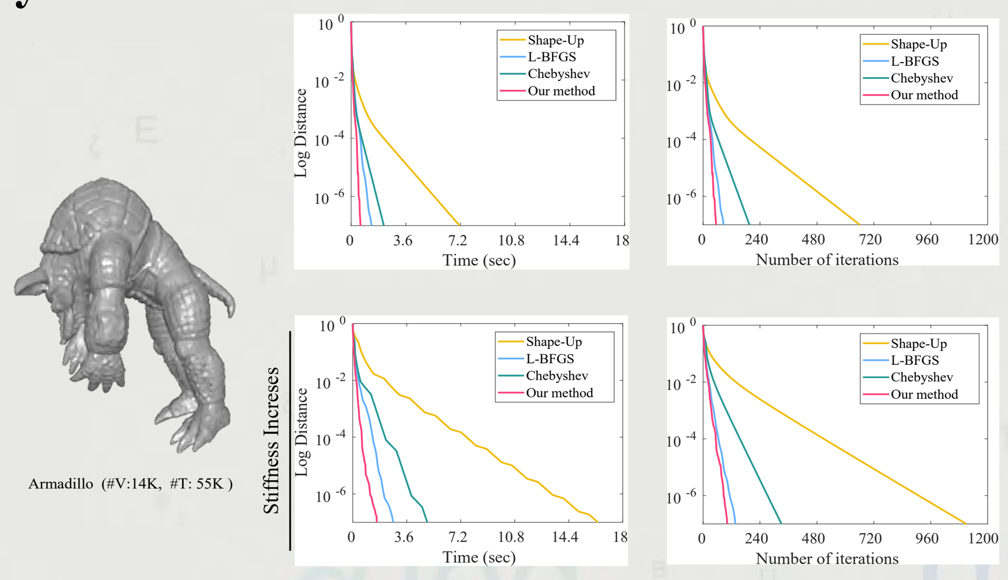
- **Wire mesh design.**



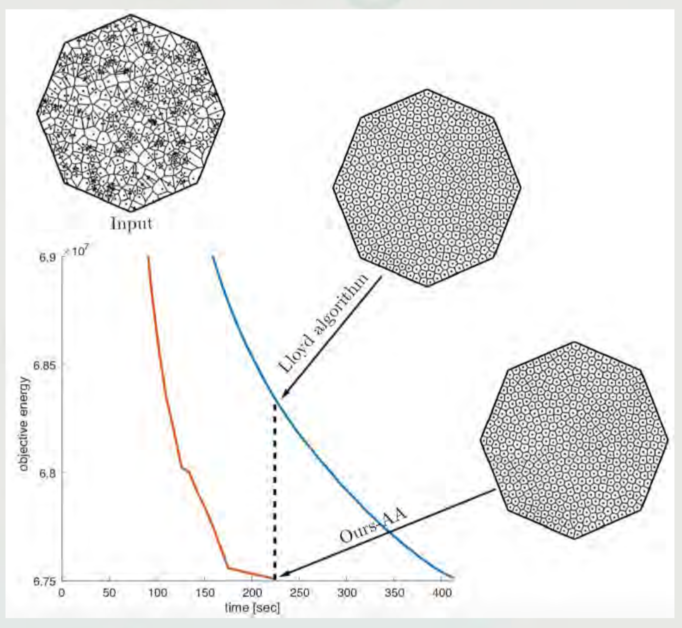
- **Parameterization**



- **Physics simulation**



- **Centroidal Voronoi tessellation (CVT)**



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最新成果 (Siggraph 2018) 报告2. 3

Progressive Parameterizations

Ligang Liu Chunyang Ye Ruiqi Ni Xiao-Ming Fu

University of Science and Technology of China

报告时间：2018年5月5日 17:30-17:45

报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：傅孝明，中国科学技术大学数学学院副研究员，2011年本科毕业于中国科学技术大学自动化专业，2016年6月在中国科学技术大学自动化系获得博士学位。自2012年起，傅孝明一直从事计算机图形学与数字几何处理方面的研究，主要是网格生成、映射计算及其在VR中的应用。在各向异性网格生成、几何映射计算、VR实际行走等方面取得了一定的成果，相关论文均发表在计算机图形学领域的重要国际期刊和会议上，包括SIGGRAPH、SIGGRAPH Asia、TVCG等。

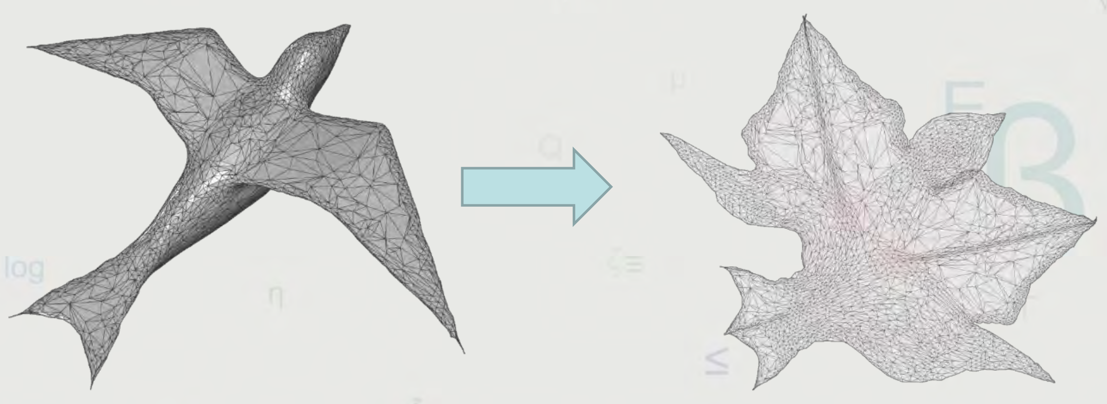
报告人：傅孝明，中国科学技术大学

报告人邮箱：fuxm@ustc.edu.cn

个人主页：staff.ustc.edu.cn/~fuxm

Problem

- **Inversion-free and low distortion parameterization**



Challenges

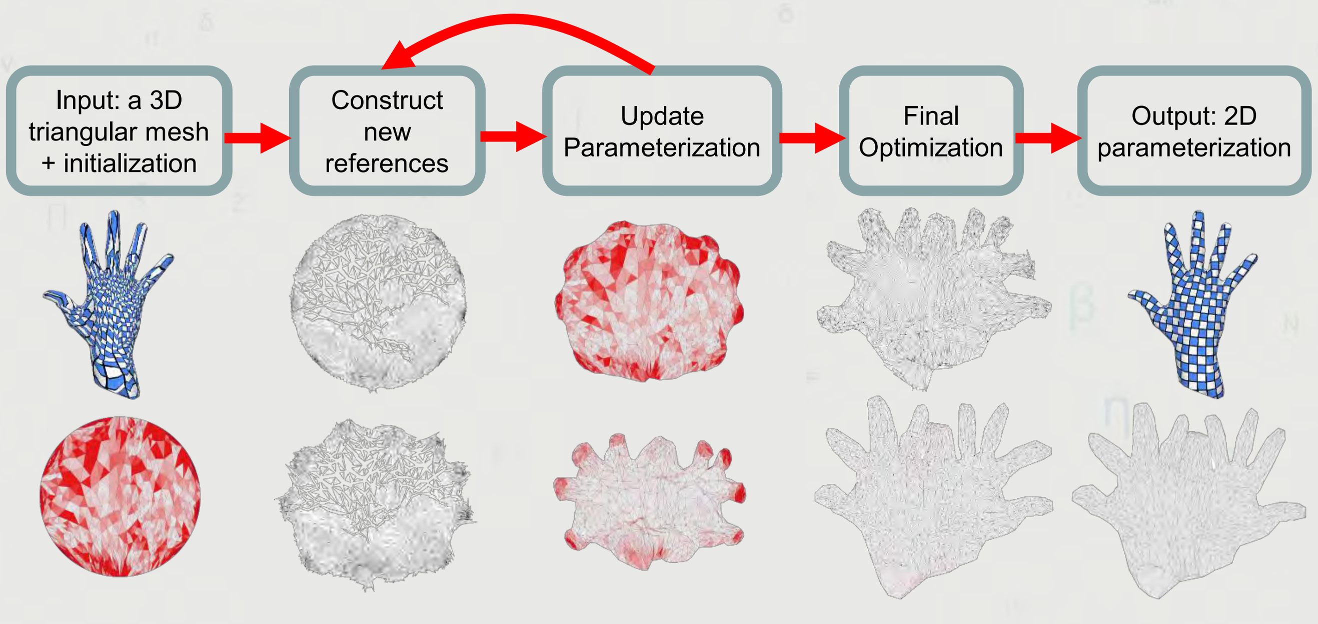
- **The optimization problem contains the following property:**
  - **Extremely large distortion on initialization**
  - **Highly non-linear and non-convex function**
  - **Converge slowly**

Key observation

- **Only a few iterations are necessary when the distortions between the objective and current status are bounded**

Pipeline

- **Construct a sequence of reference triangles instead of optimizing the origin problem**



Hybrid solver

- **SLIM: recover very quickly from the bad initialization but converge very slowly**
- **CM: second order method, converge quickly**
- **Our method begins with the SLIM solver and end with the CM solver**

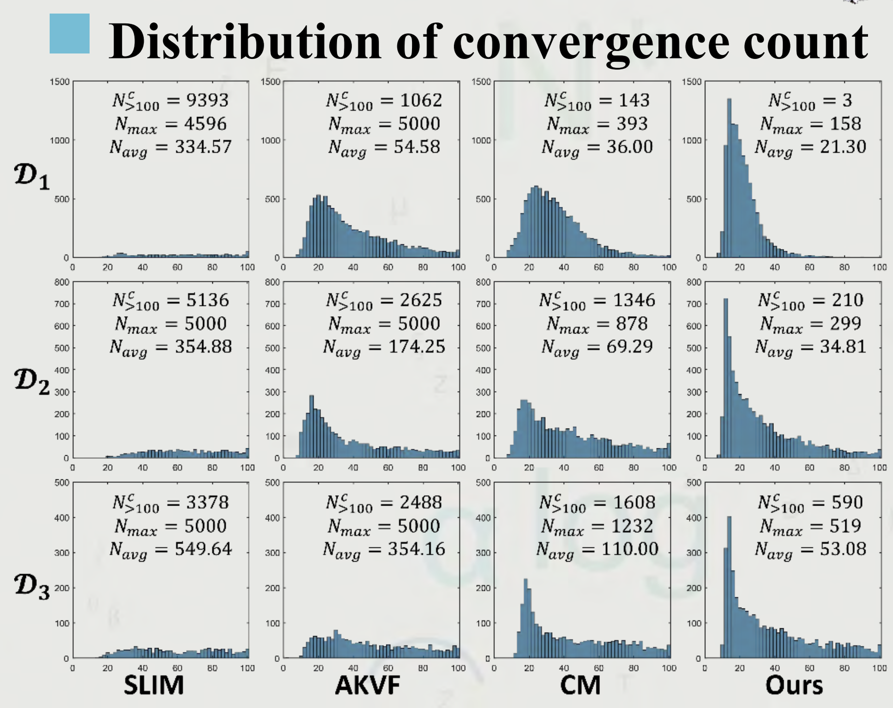
Experiments and applications

- **$\mathcal{D}_1$: 10273 well cut meshes**

- **$\mathcal{D}_2$: 6189 moderately badly cut meshes**

- **$\mathcal{D}_3$: 4250 extremely challenging meshes**

- **Distribution of convergence count**



N_c: iteration number of convergence

N_{max}: maximal N_c

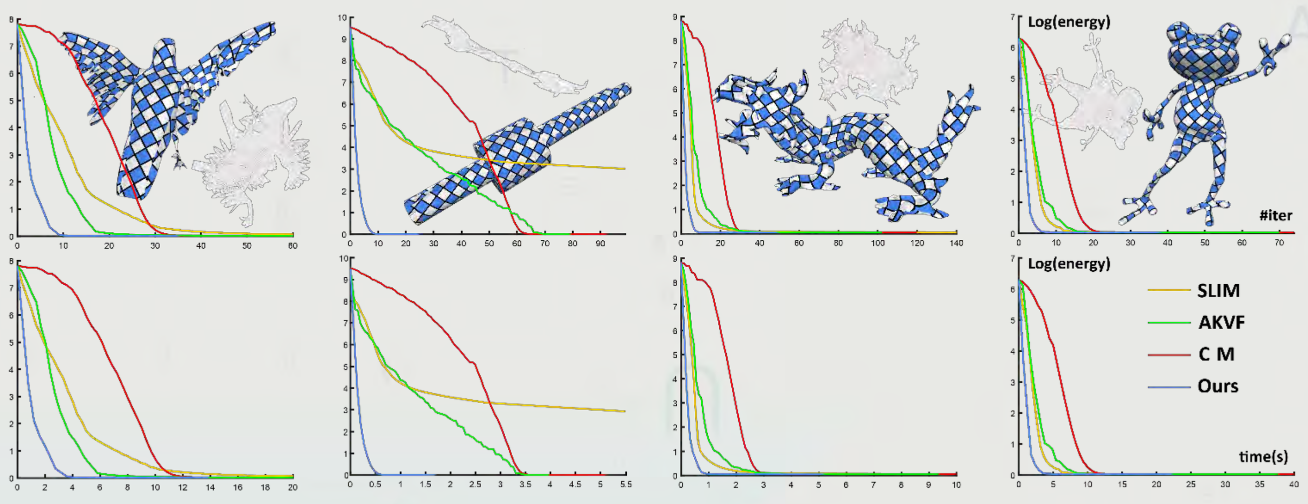
N_{avg}: average N_c

$N^c_{>100}$: the number of models whose $N_c > 100$

SLIM:[Rabinovich et al. 2017]

CM:[Shtengel et al. 2017]

AKVF:[Claici et al. 2017]



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最新成果 (Siggraph 2018) 报告2. 4

Object-aware Guidance for Autonomous Scene Reconstruction

Ligang Liu[1] Xi Xia[1] Han Sun[1] Qi Shen[1] Juzhan Xu[2]
Bin Chen[2] Hui Huang[2] Kai Xu[2,3]

[1]University of Science and Technology of China
[2]Shenzhen University
[3]National University of Defense Technology

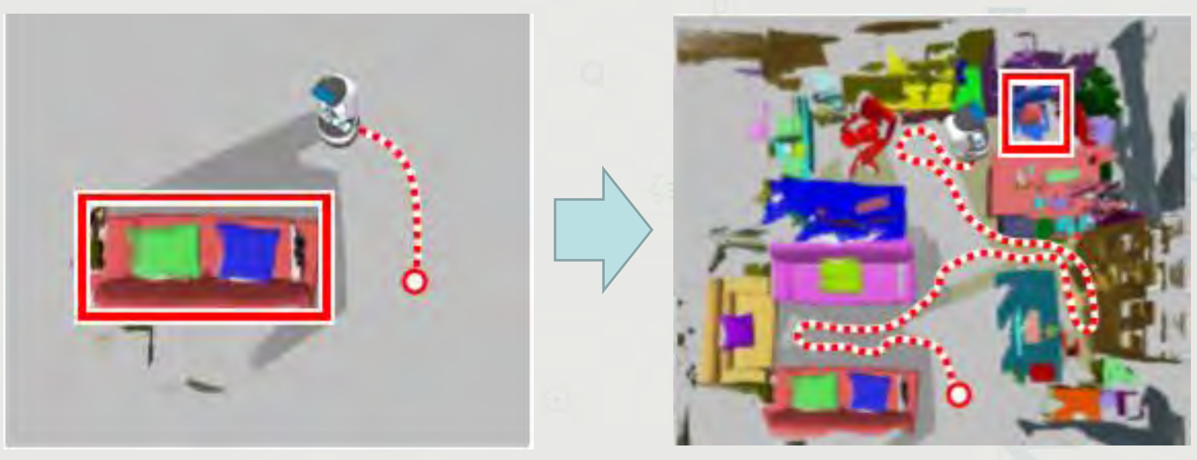
报告时间：2018年5月5日 17:45-18:00
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：夏熙，中国科学技术大学数学科学学院硕士研究生。2011年进入中国科学技术大学数学院学习，于2015年获得学士学位，并与2015年开始攻读硕士学位，指导导师刘利刚教授。研究兴趣围绕三维重建，机器人自动扫描、重建和场景分析。

报告人：夏熙，中国科学技术大学
报告人邮箱：againxx@mail.ustc.edu.cn

Problem

Automatically explore, reconstruct and understand unknown scenes within one navigational pass



Motivation and challenges

Key insights:

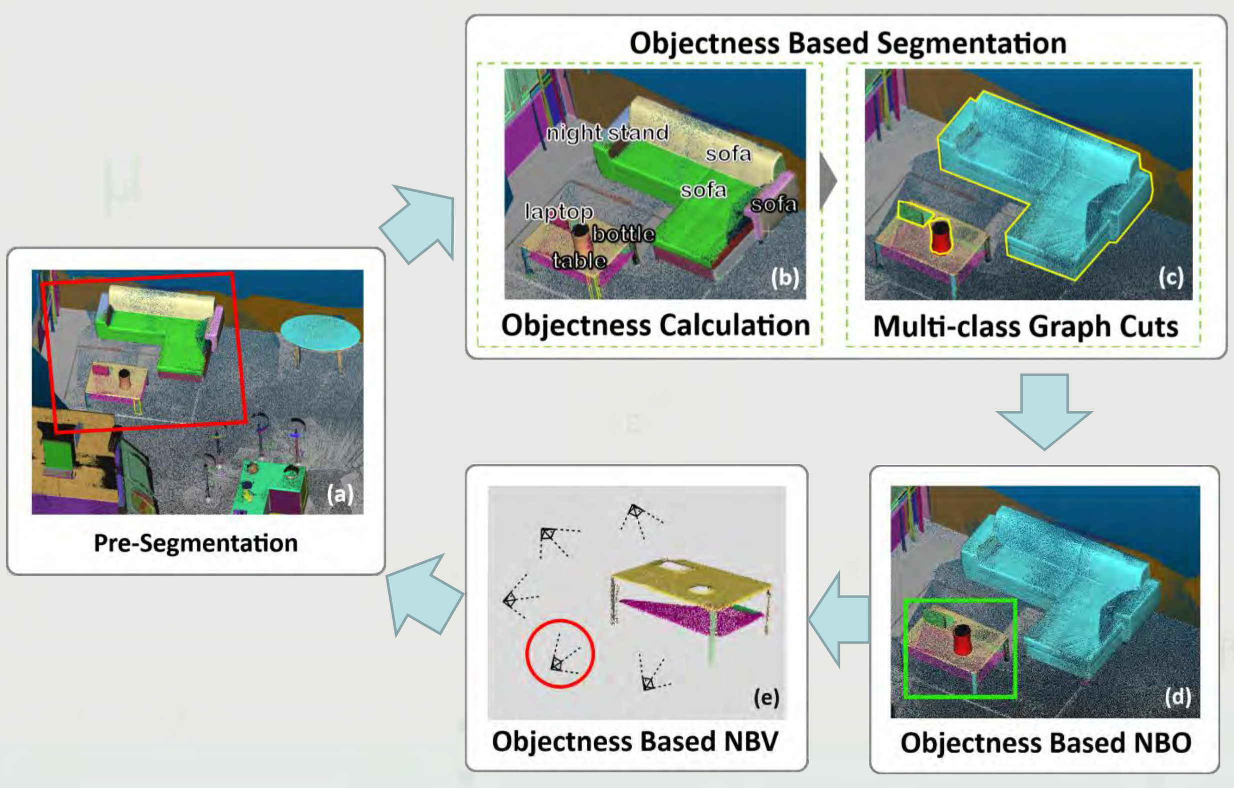
- A scene can be described by a sequence of objects.
- Humans can largely guide and prioritize their scanning effort by the objects they recognize based on the distances, the saliency and the familiarity of the objects.

Challenges

- Define a reasonable metric for objects.
- Simultaneously segment and recognize objects.
- Propose an object-guided exploration and scanning strategy.

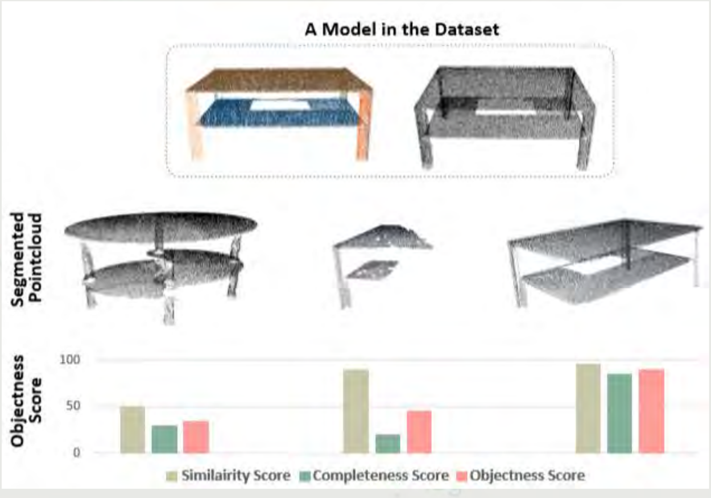
Basic Idea

Use a model-driven objectness metric for segmentation, recognition and scanning strategy:



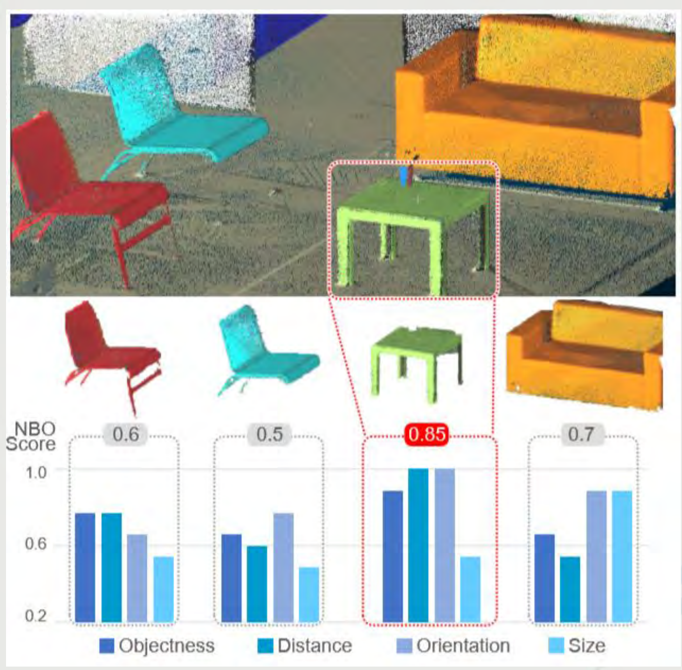
Key Components:

Objectness score

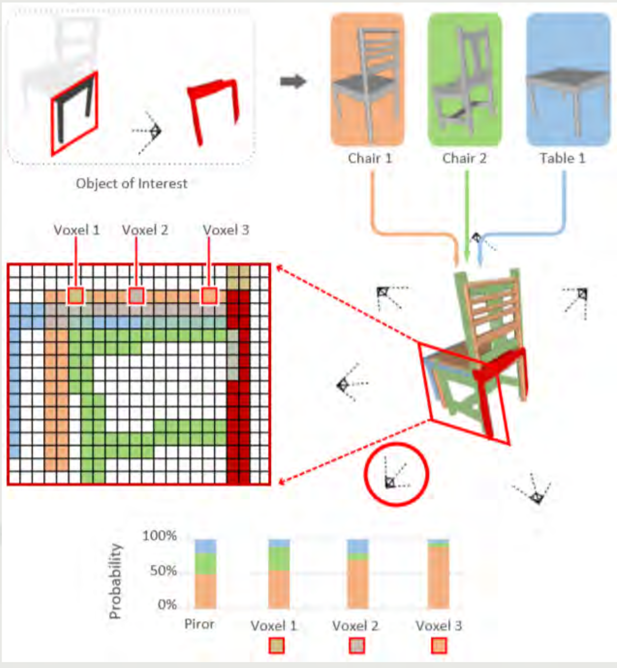


Objectness-based segmentation

Next-best-object



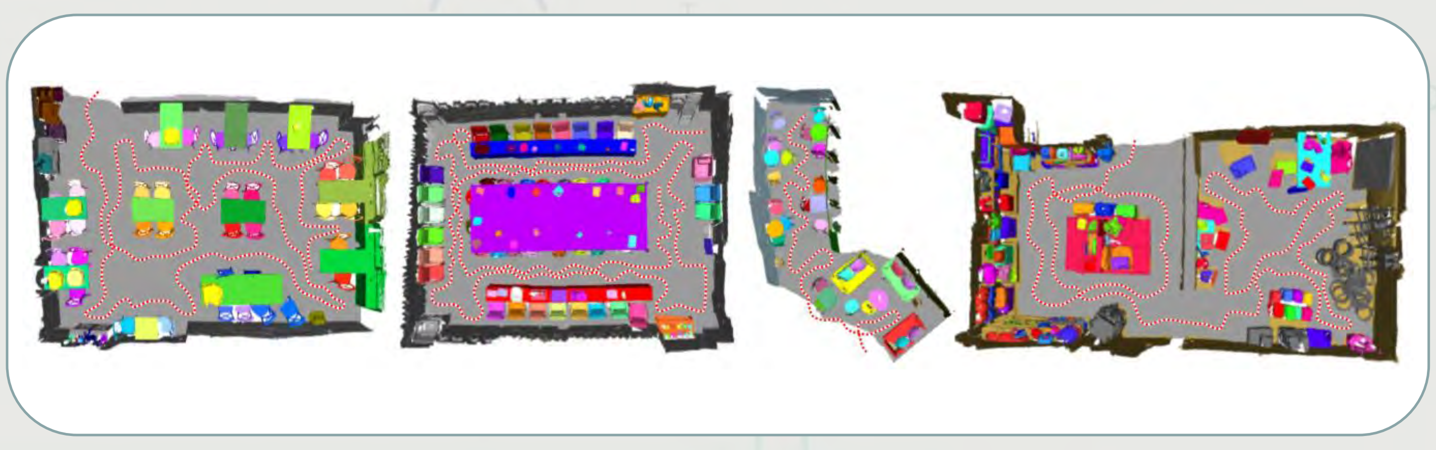
Next-best-view



Experiments and applications

Virtual scene results

Real scene results



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最新成果 (Siggraph 2018) 报告3. 1

Predictive and Generative Neural Networks for Object Functionality

Ruizhen Hu[1] Zihao Yan[1] Jingwen Zhang[1] Oliver Van Kaick[2]
Ariel Shamir[3] Hao Zhang[4] Hui Huang[1]

[1]Shenzhen University [2]Carleton University
[3]The Interdisciplinary Center [4]Simon Fraser University

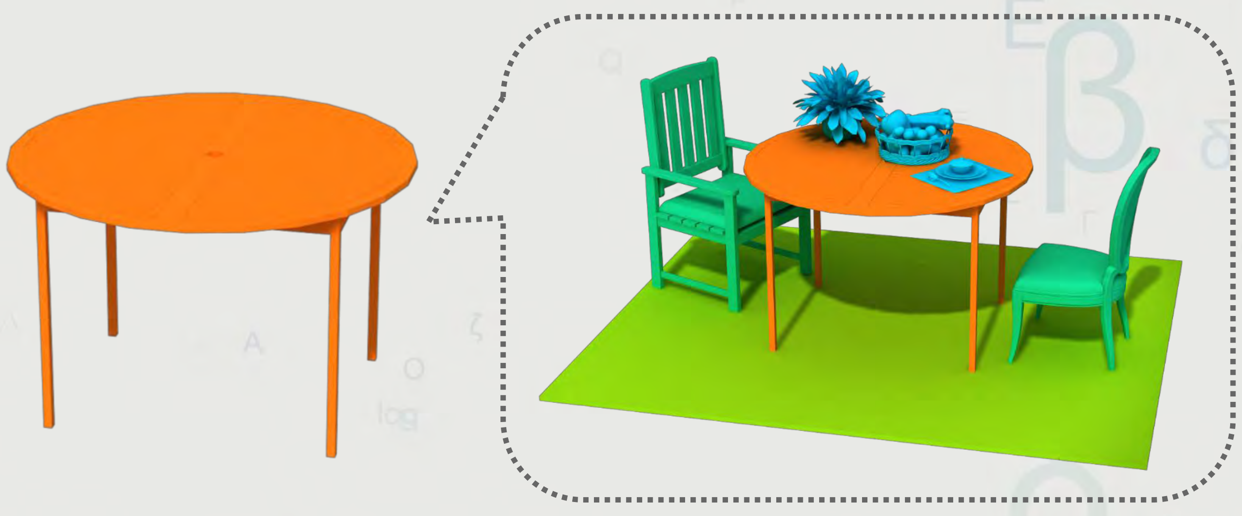
报告时间：2018年5月6日 08:20-08:35
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：胡瑞珍，女，博士，深圳大学计算机与软件学院助理教授，中科协"青年人才托举工程"(2017-2019)入选者，深圳市海外高层次孔雀人才，深圳市南山区领航人才。2015年6月毕业于浙江大学数学系，取得理学博士学位，并获浙江省优秀毕业研究生称号。攻读博士学位期间，获国家留学基金委资助访问加拿大西蒙弗雷泽大学两年。研究方向为计算机图形学，特别是高层次形状分析、几何处理和模型制造。近些年的主要学术成果均发表在本领域国际顶级会议和期刊，研究课题连贯性强，已初步形成个人研究特色。截止目前，共发表16篇高水平论文，其中9篇发表在计算机图形学顶级会议/期刊ACM SIGGRAPH / SIGGRAPH ASIA / TOG，3篇发表在计算机图形学国际权威期刊Computer Graphics Forum。担任The Visual Computer编委，Eurographics 2018, SIGGRAPH Asia Techinical Brief & Poster 2017, CAD/Graphics 2017, CVM 2017, ICVRV 2017, SIGGRAPH Asia Workshop 2016等程序委员会成员。

报告人：胡瑞珍，深圳大学
报告人邮箱：ruizhen.hu@gmail.com
个人主页：csse.szu.edu.cn/staff/ruizhenhu

Problem

- Given an isolated object, whether a machine can "hallucinate" the usage scenarios like humans?

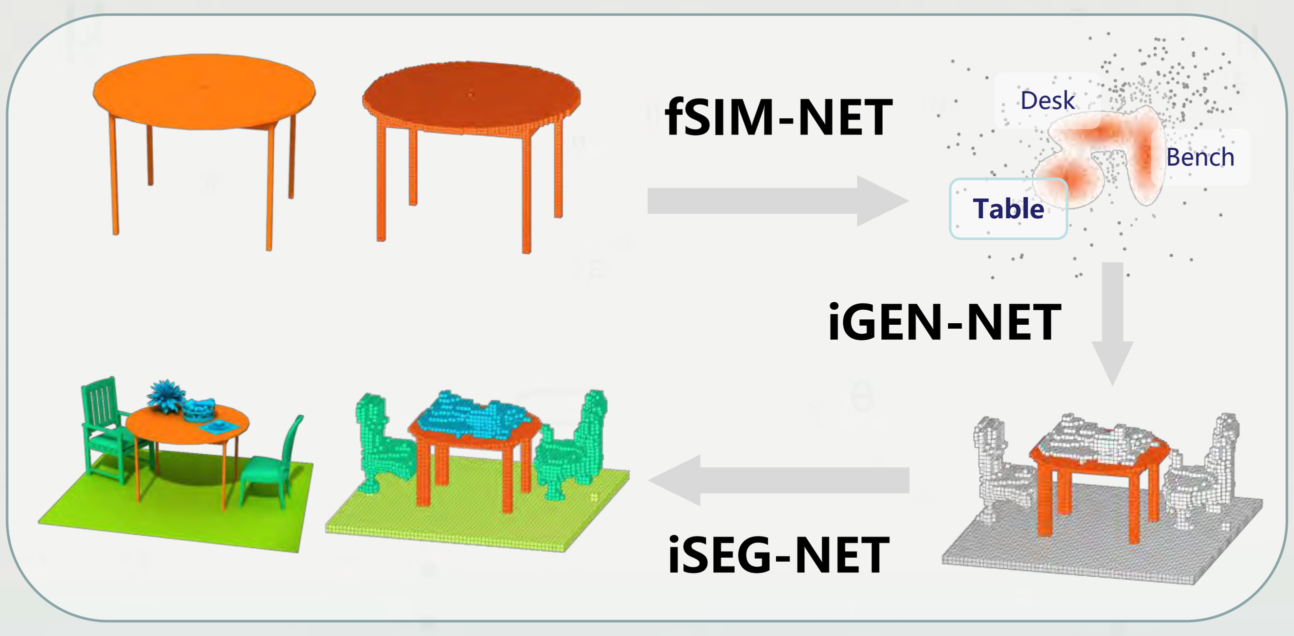


Motivation and challenges

- Key observations:
  - "Interaction context": the functionalities of an object can be revealed by a 3D scene that contains the object and one or more objects around it.
  - "Interaction hallucination": humans can predict the functionality of an object without any surroundings based on their knowledge and experience.
- Challenges in prediction:
  - Learn a space of interaction contexts defined by functional similarities.
- Challenges in generation:
  - Train a generative model which takes a single object as input and produces contexts.

Key idea

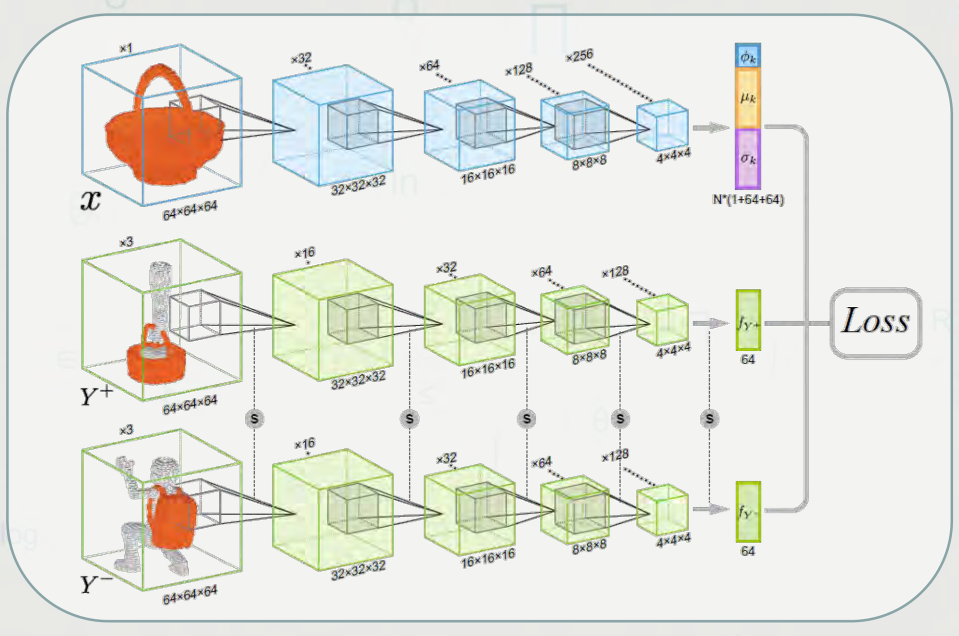
- Use deep convolutional neural networks for functionality analysis and interaction hallucination:



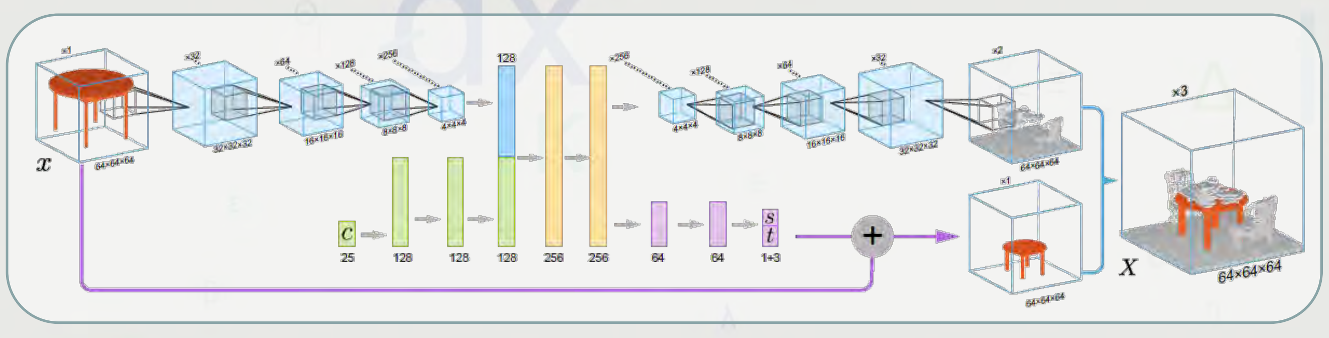
Network structure:

- fSIM-NET:

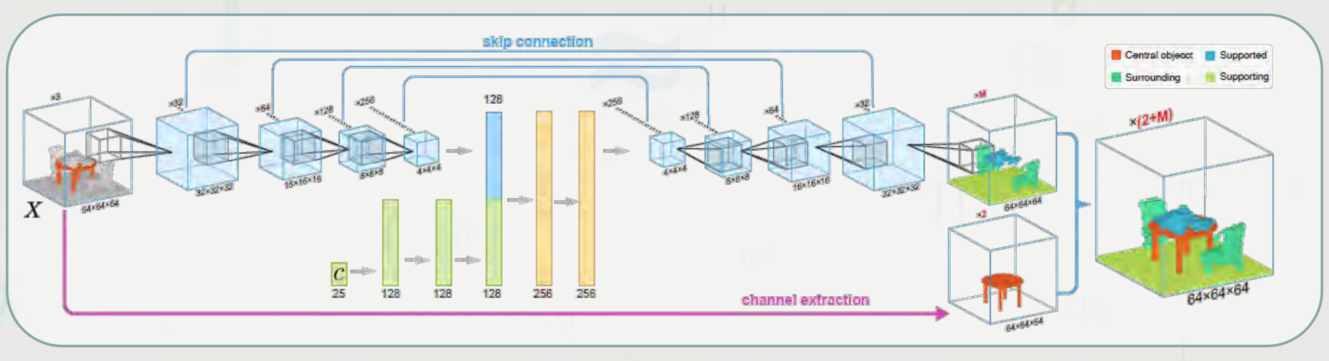
Functional Similarity Network



- iGEN-NET: *Context Generation Network*

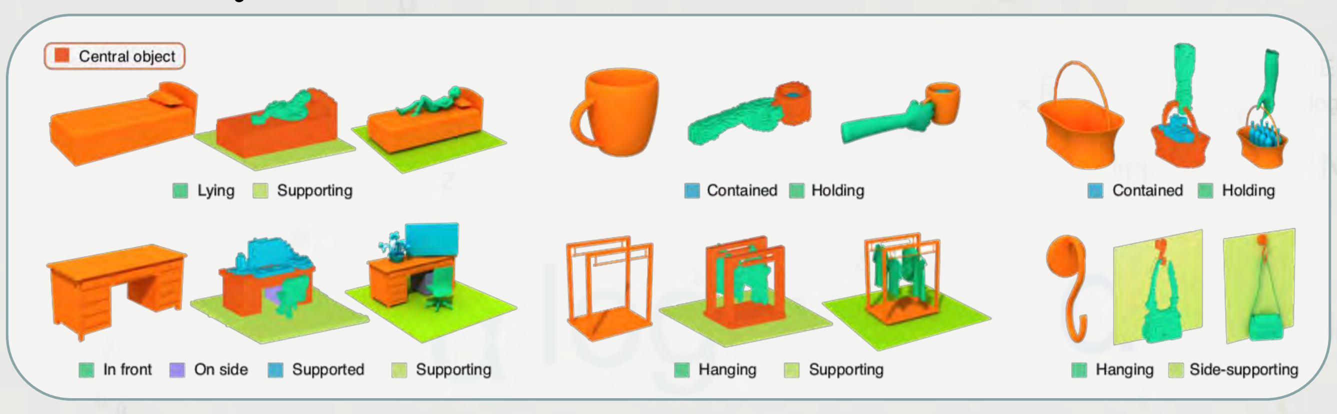


- iSEG-NET: *Segmentation Network*

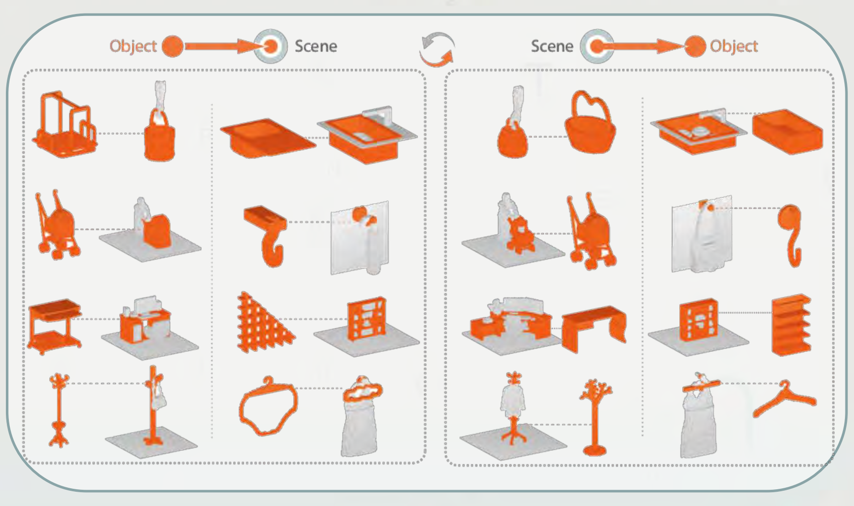


Experiments and applications

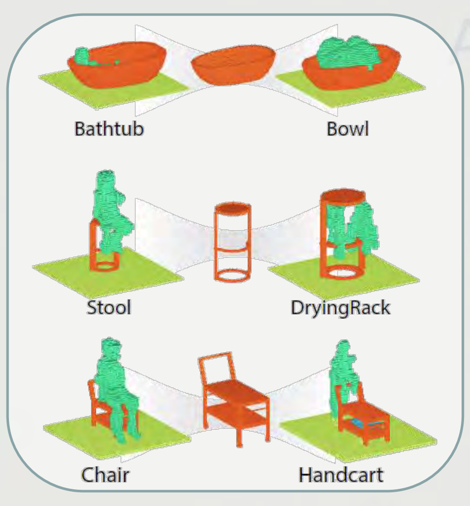
- Gallery of hallucination results



- Object ↔ scene retrieval



- Multi-func synthesis



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最新成果 (SIGGRAPH 2018) 报告3. 2

Non-Stationary Texture Synthesis by Adversarial Expansion

Yang Zhou[1,2] Zhen Zhu[2] Xiang Bai[2] Dani Lischinski[3]
Daniel Cohen-Or[4] Hui Huang[1]

[1]Shenzhen University
[2]Huazhong University of Science and Technology
[3]Hebrew University of Jerusalem
[4]Tel Aviv University

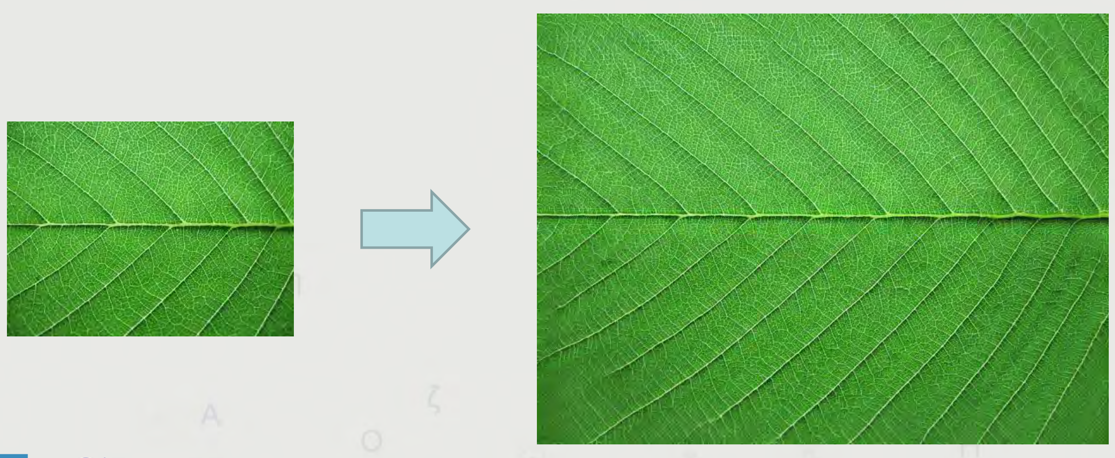
报告人：周漾，华中科技大学
报告人邮箱：zhouyangvcc@gmail.com

报告时间：2018年5月6日 08:35-08:50
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：周漾，男，博士。2007年与2013年于武汉大学分别获得工学学士与工学博士学位，专业摄影测量与遥感。2014年至2016年，在中科院深圳先进技术研究院进行博士后研究。随后在深圳大疆创新科技有限公司和深圳大学短暂工作。2017年12月加入华中科技大学电信学院，任讲师职位。研究领域涉及数字摄影测量、计算机图形学与计算机视觉。在SIGGRAPH、SIGGRAPH ASIA、Eurographics、CVPR等发论文多篇。2012年作为主要参与人获得了国家测绘科技进步奖一等奖。2014年3月获得美国摄影测量与遥感协会（ASPRS）约翰戴维森主席奖一等奖，以及波音图像分析与解译最佳科学论文奖。

Problem

- Example-based texture synthesis

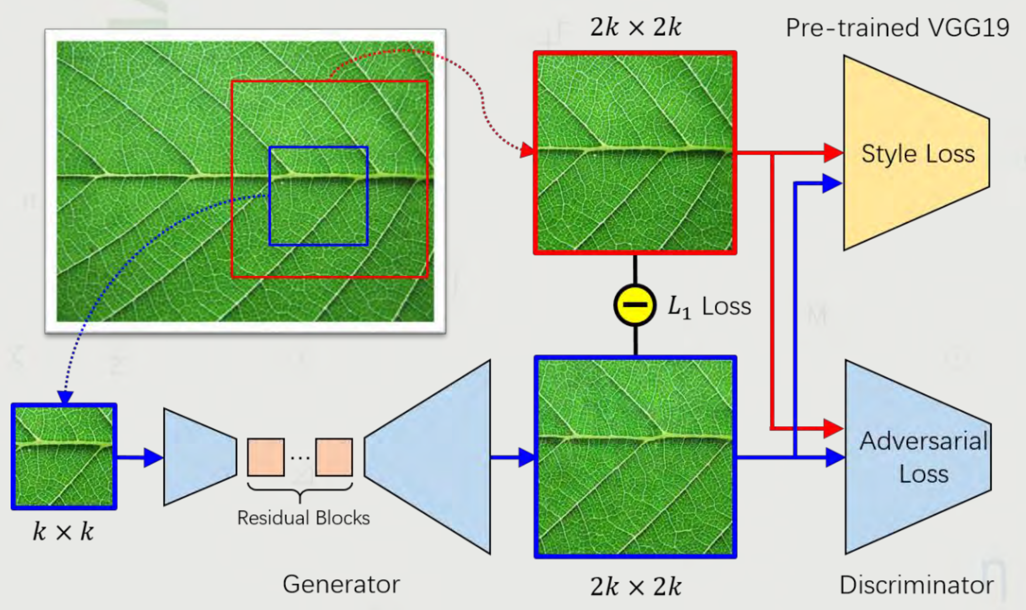


Challenges

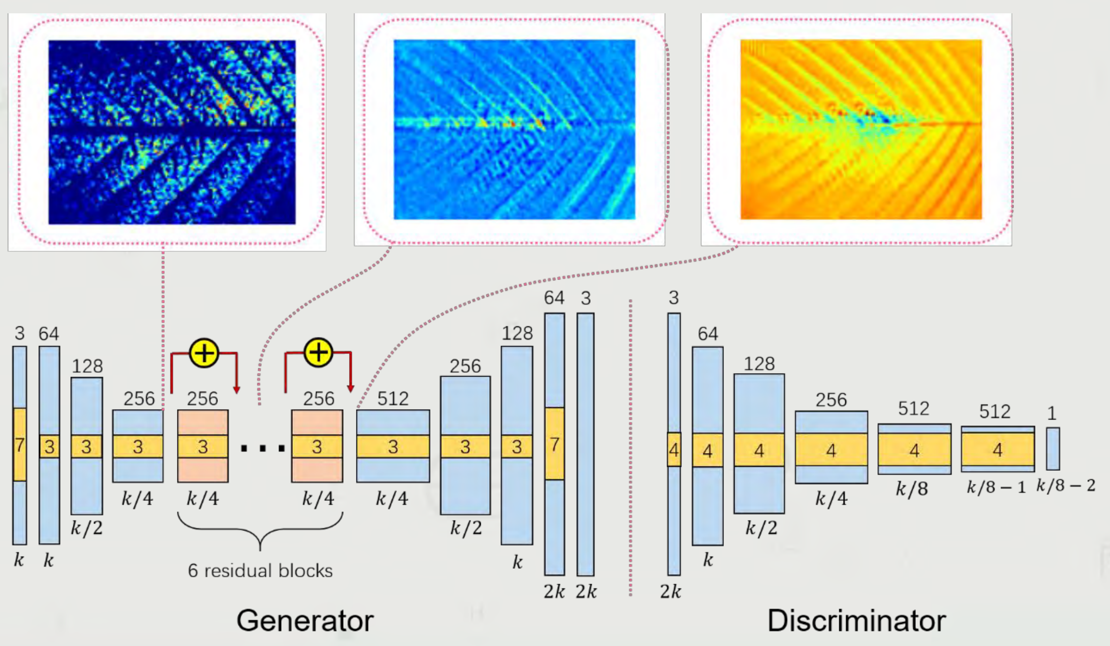
- Limited sources with spatial variations
- Unique high-level structure

Our Method

- Our goal is to generate larger instances that perceptually resemble a smaller texture exemplar
- Key idea: teach a fully convolutional generator network how to expand a small texture block



Method Overview

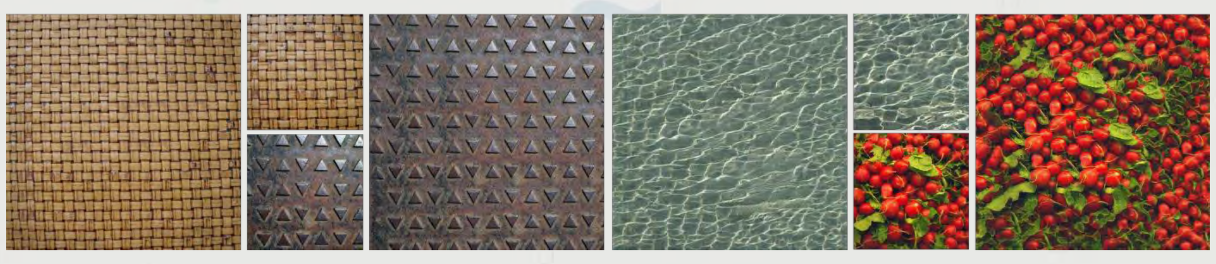


Network Architecture

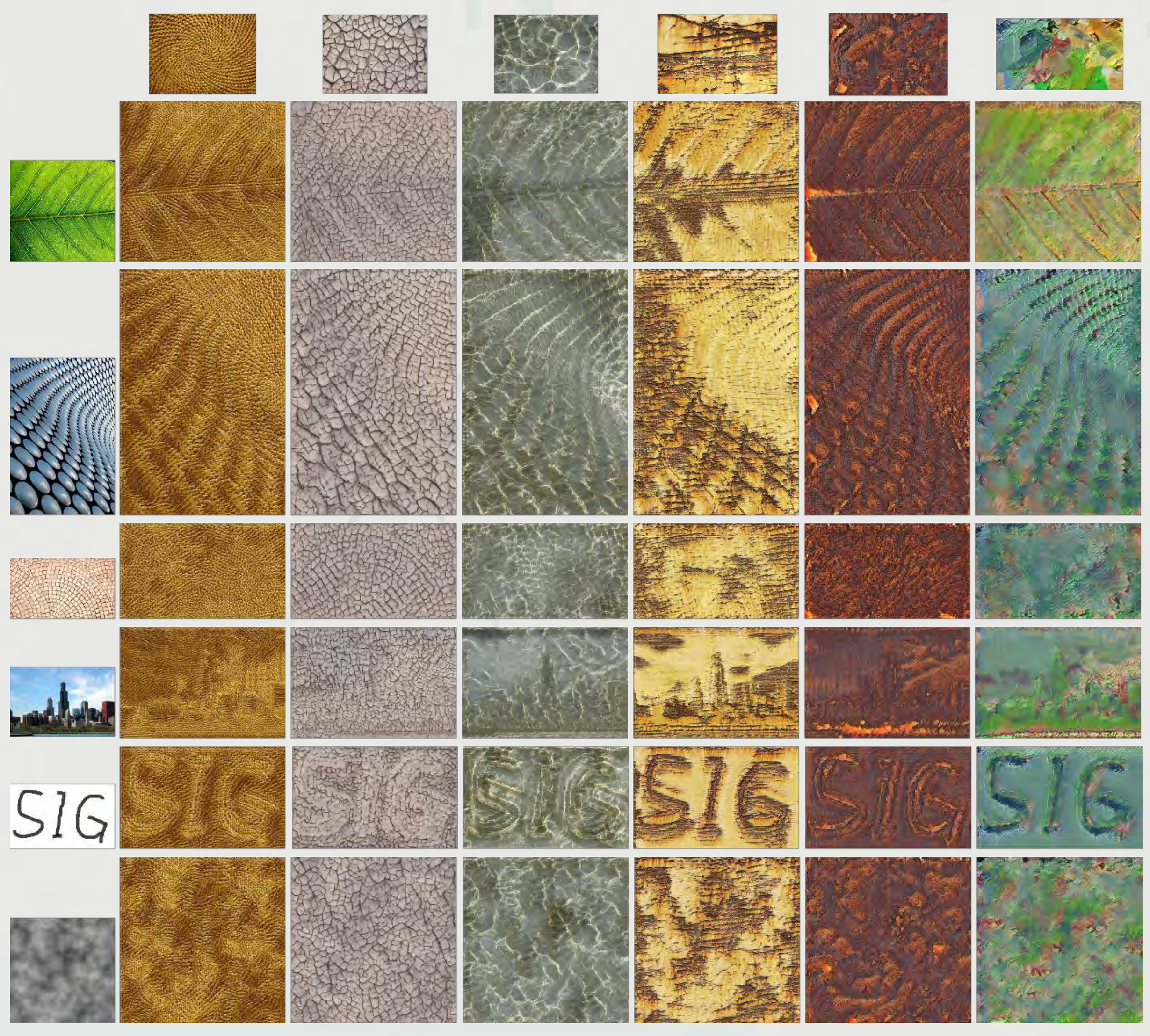
Results and applications

- Challenging non-stationary textures

- Stationary textures



- Texture transfer



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GAMES 2018

计算机图形学与混合现实前沿研讨会

最新成果 (SIGGRAPH 2018) 报告3. 3

Creating and Chaining Camera Moves for Quadrotor Videography

KE XIE[1], HAO YANG[1], SHENGQIU HUANG[1], DANI LISCHINSKI[2], MARC CHRISTIE[3], KAI XU[1,4], MINGLUN GONG[5], DANIEL COHEN-OR[1,6], HUI HUANG[1*]

[1]Shenzhen University
[2]The Hebrew University of Jerusalem
[3]IRISA/INRIA Rennes Bretagne
[4]National University of Defense Technology
[5]Memorial University of Newfoundland
[6]Tel Aviv University

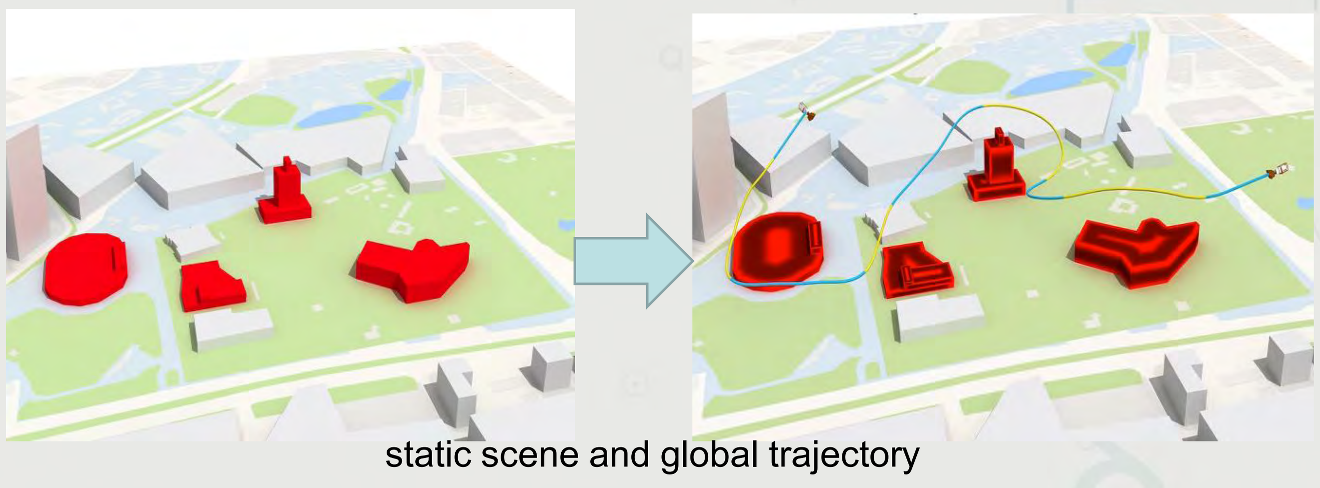
报告时间：2018年5月6日　08:50-09:05
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：谢科，博士毕业于中国科学院大学，导师黄惠&陈宝权；现就职于深圳大学计算机与软件学院，主要研究方向包括基于点云的建模和场景理解，大规模场景无人机航拍路径生成等等。

报告人：谢科，深圳大学
报告人邮箱：ke.xie@szu.edu.cn

Problem

Automatic Trajectory Generation and Shooting for UAV on Large 3D Static Scene



static scene and global trajectory

Motivation and Challenge

Manually capturing aerial videos with a quadrotor mounted camera is a challenging creative task:

- Simultaneously control the quadrotor's motion and the mounted camera's orientation
- Keep the drone in sight
- Hard to follow a long and smooth trajectory

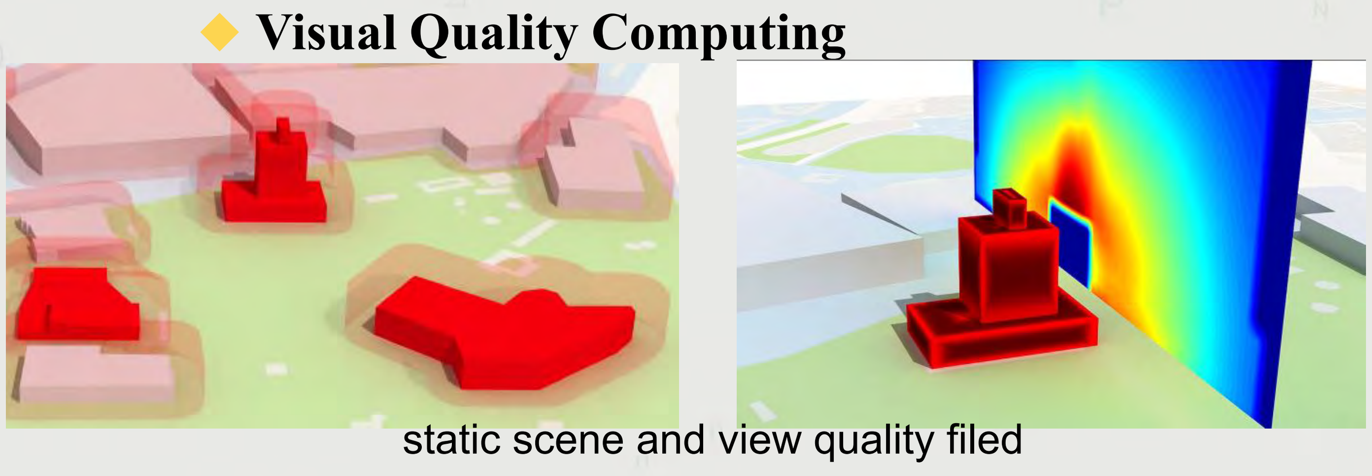
Automatic path generation and shooting control

- Predefine trajectory the drone will follow
- Predefine camera orientations
- Let the drone fly automatically

Idea

Key Steps

- Visual Quality Computing

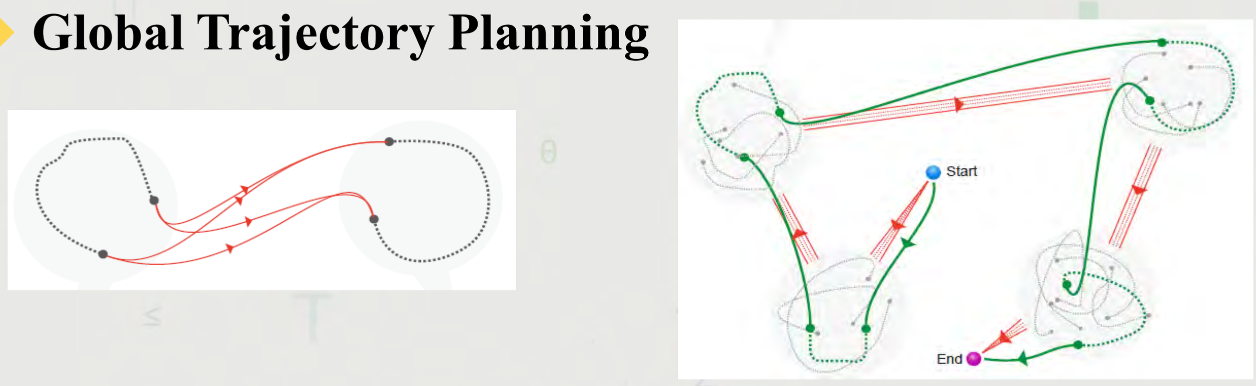


static scene and view quality filed

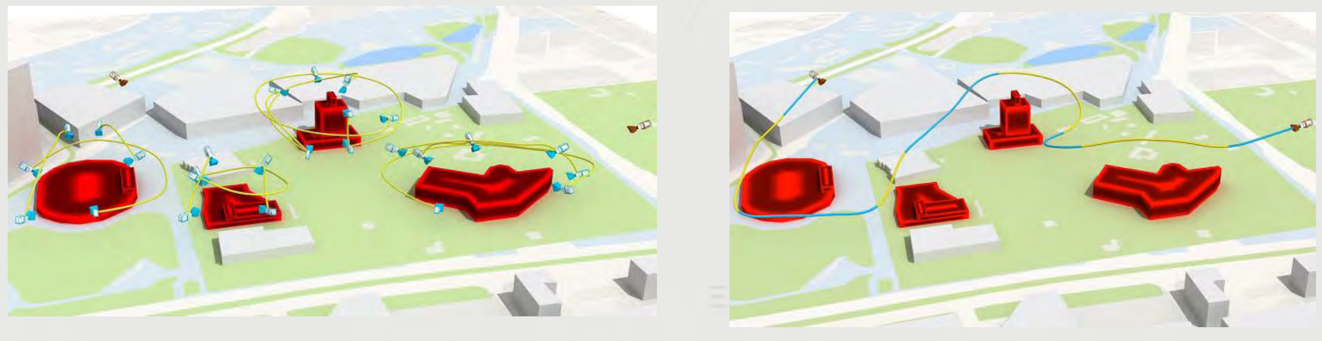
- Local Trajectories Generating

trajectory interpolation and local trajectory candidates

- Global Trajectory Planning

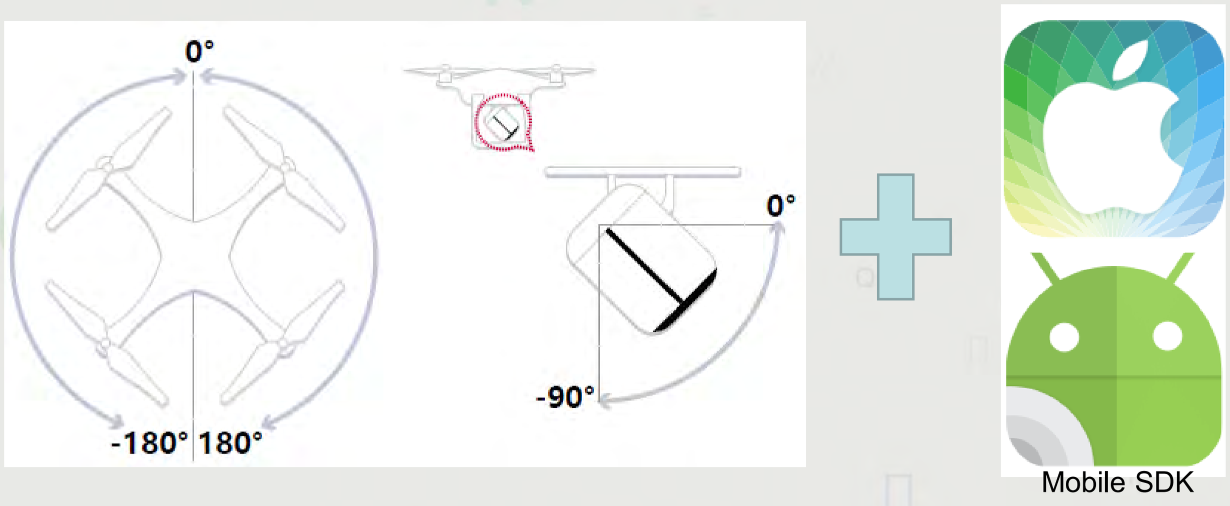


global optimal path is computed via solving STSP



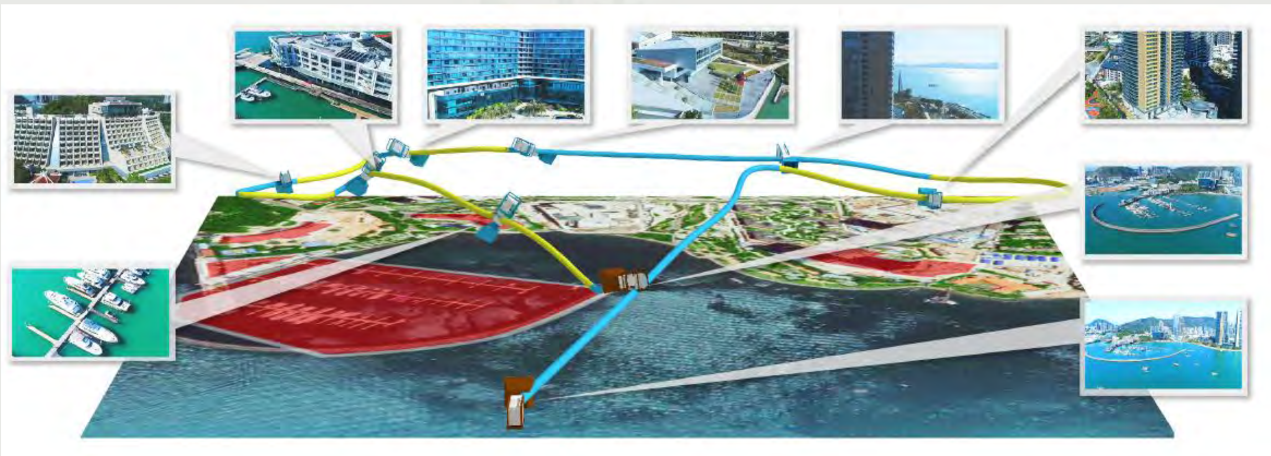
Experiments and Applications

Drone system



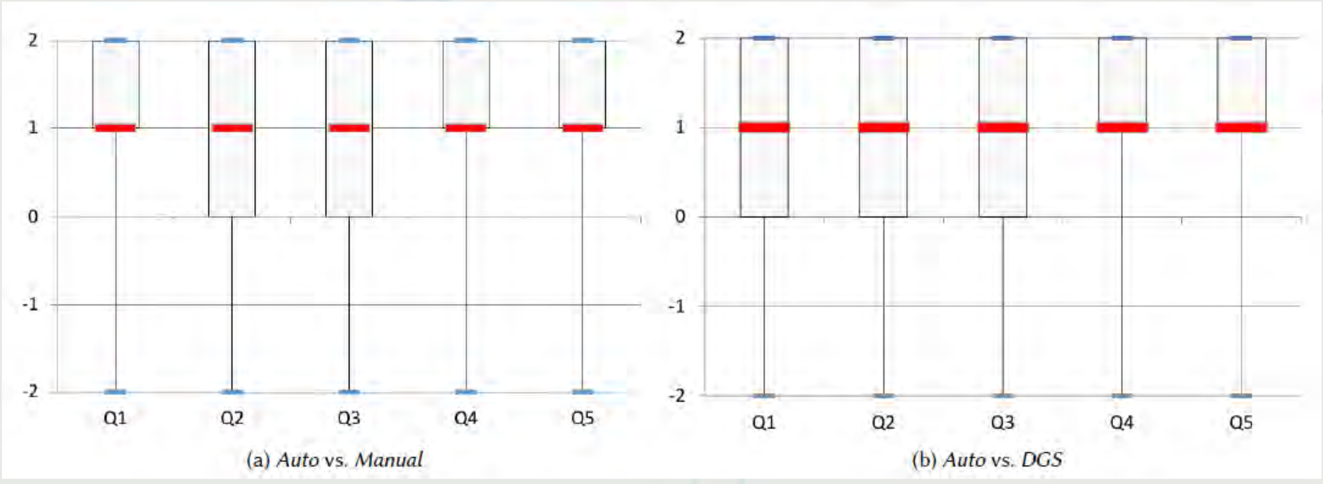
DJI drone&camera model which is controlled by app via DJI mobile SDK

Large scene shooting



Sea World: five landmarks(highlighted in red) and global trajectory(2988m long)

User study



Boxplot visualizations of the user evaluation comparing.
(a) Auto vs. Manual videos, and (b) Auto vs. DGS videos.

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最新成果 (SIGGRAPH 2018) 报告3. 4

Full 3D Reconstruction of Transparent Objects

Bojian Wu[1,2] Yang Zhou[2,3] Yiming Qian[4] Minglun Gong[5] Hui Huang[2*]

[1]Shenzhen Institutes of Advanced Technology
[2]Shenzhen University
[3]Huazhong University of Science and Technology
[4]University of Alberta
[5]Memorial University of Newfoundland

报告时间：2018年5月6日 09:05-09:20
报告地点：中国科学技术大学东区管理科研楼2楼报告厅

报告人简介：吴博剑，中国科学院在读博士，主要研究方向是三维形状分析，基于图片的三维重建等，指导老师是黄惠教授。

报告人：吴博剑，中科院/深圳大学
报告人邮箱：ustcbjwu@gmail.com

Problem

Reconstructing complete 3D shapes of transparent objects with known refractive index

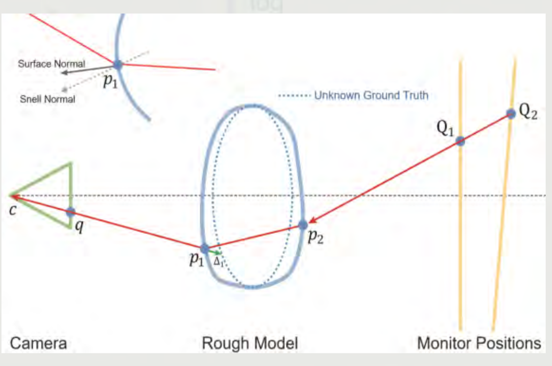
Challenge

Transparent objects do not have their own appearances, such that conventional color/texture matching based approaches cannot be applied

Idea

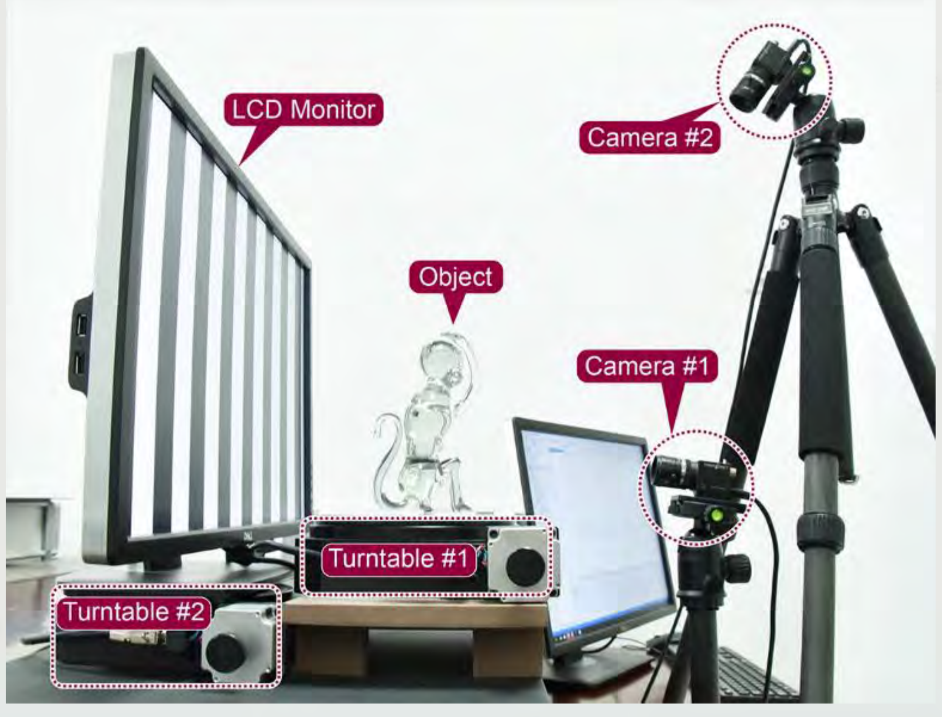
How transparent objects refract lights can be used for surface geometry inference

Silhouettes can be applied for shape initialization and also provide accurate boundary constraints

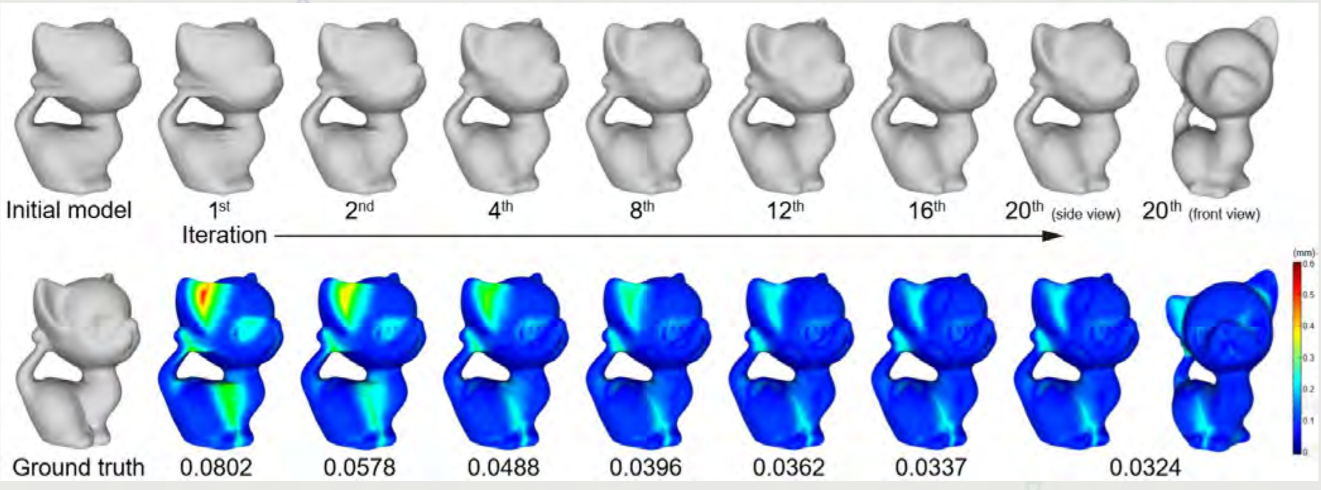


Algorithm

Data capturing



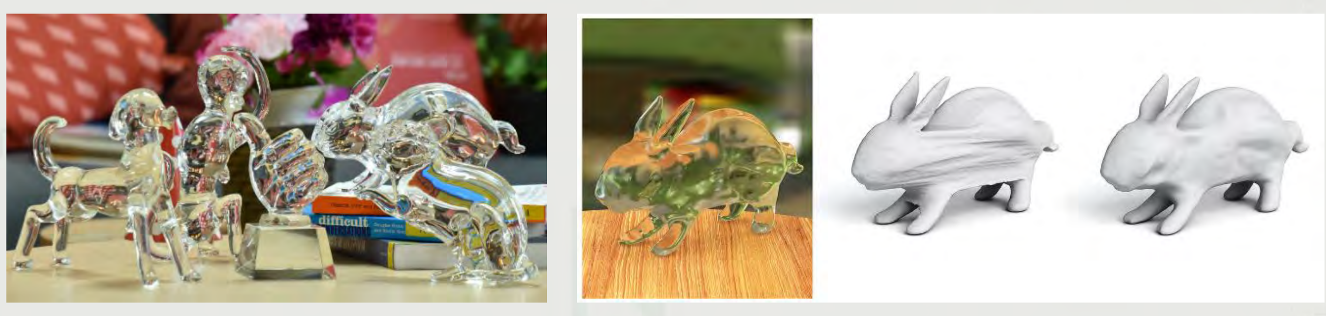
Surface reconstruction

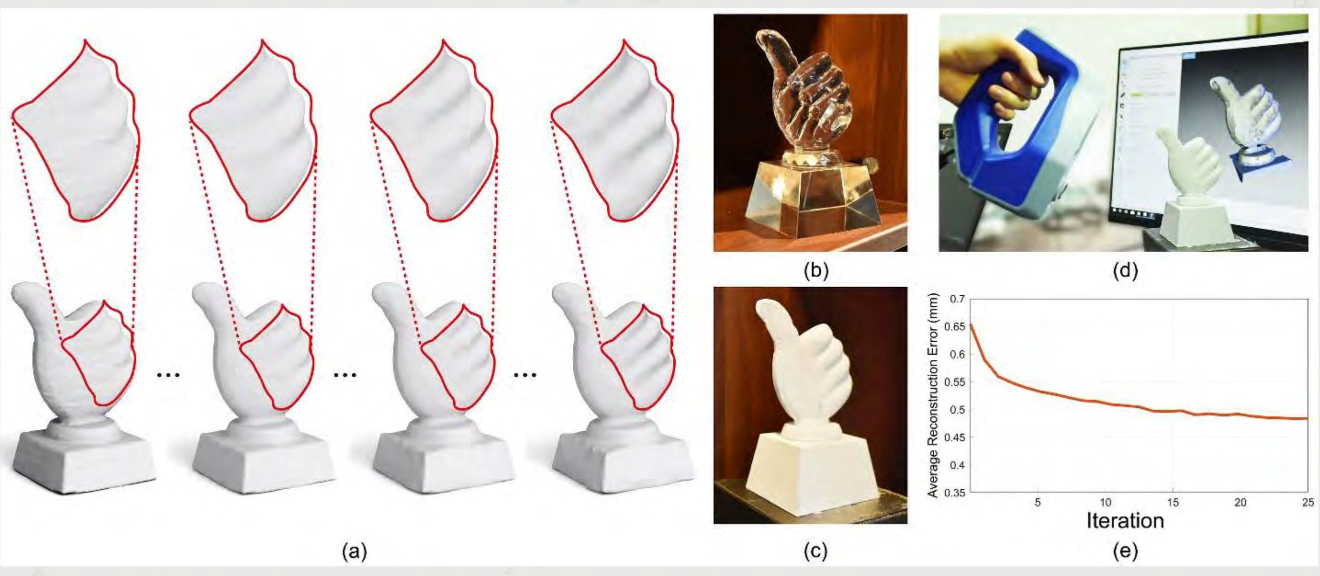


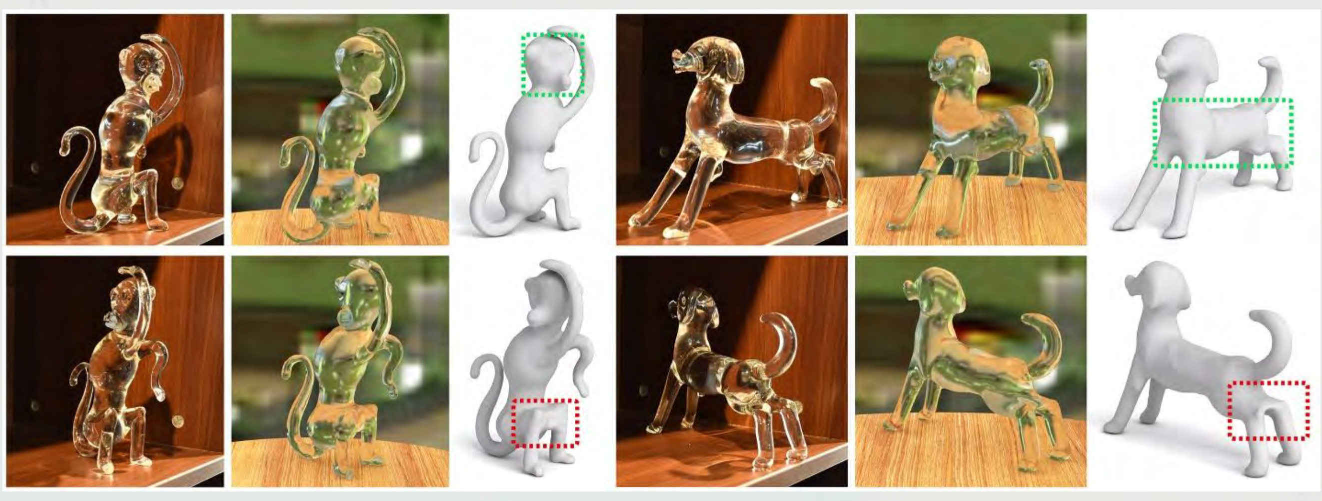
Experiment

Synthetic examples

Real objects







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