

关于三维可视计算的一些思考

童欣

2017.12.

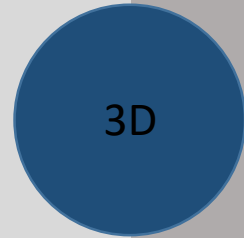
My Motivation

- Looking for an unified view for 3D visual computing
 - Finding the connection between variant research topics
 - Finding the fundamental problems
- Exploring new technique/application opportunities in computer graphics
 - Finding relationship between applications and behind techniques
 - Analyzing the technique trend
- Get more comments from YOU...

An unified view of 3D visual computing

Real World

Virtual World

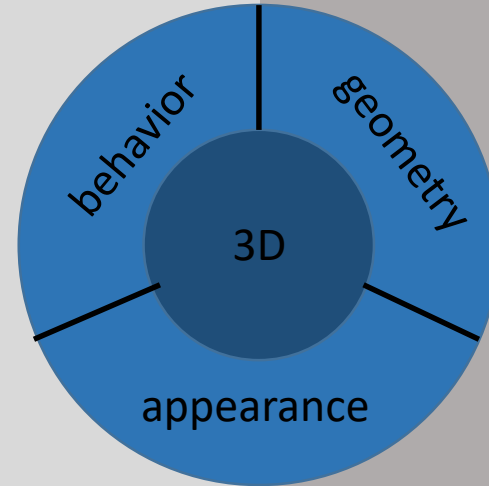


3D

Real World

Properties

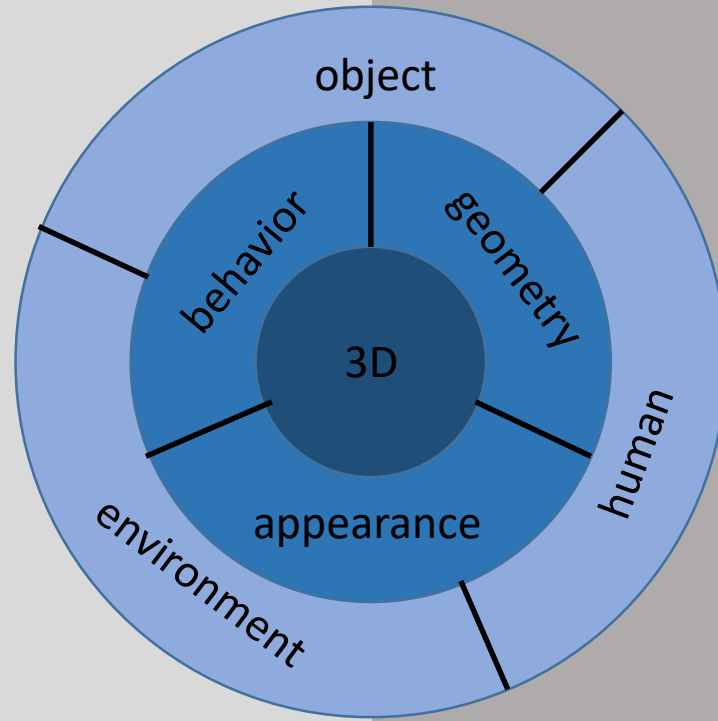
Virtual World



Real World

Subjects

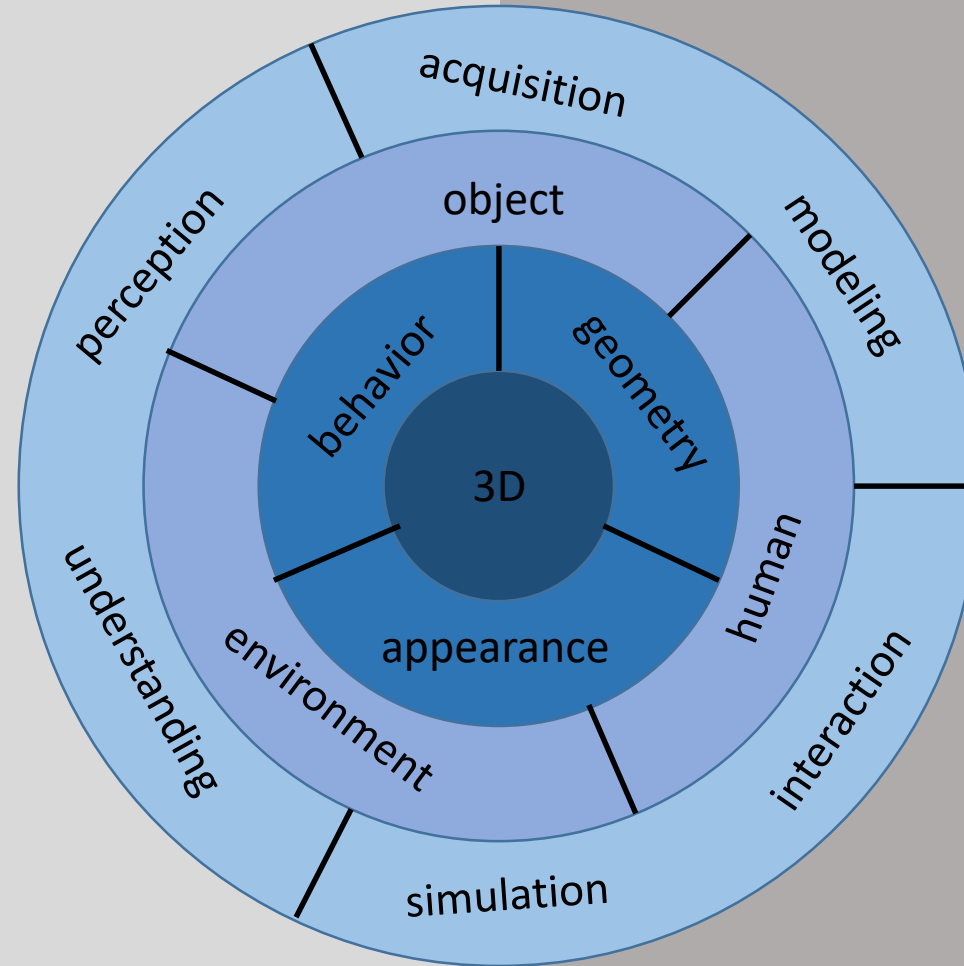
Virtual World



Real World

Techniques

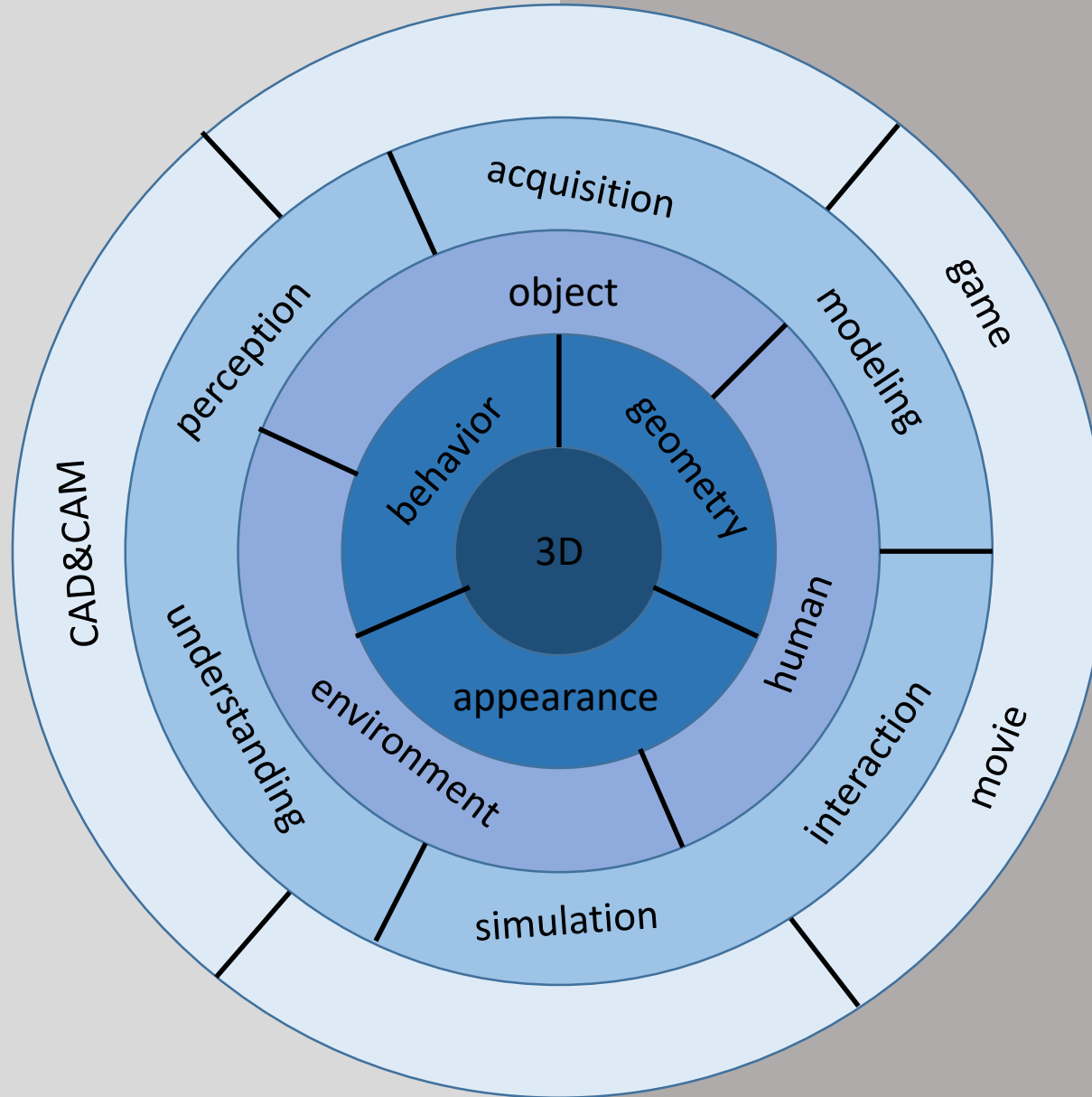
Virtual World



Real World

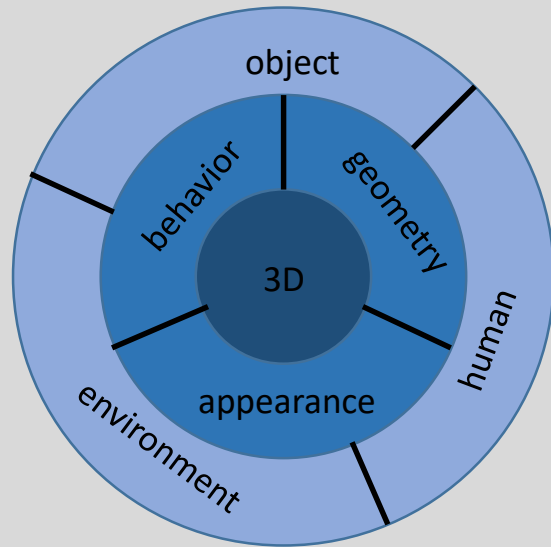
Applications

Virtual World



Transitions of 3D Visual Computing

Properties & Subjects



From separate to integrated representation

- Multiple properties of each subject
- 3D is a comprehensive representation of real world (Yunhe Pan, Songchun Zhu)



Shape & appearance acquisition
(MSRA, Hongzhi)



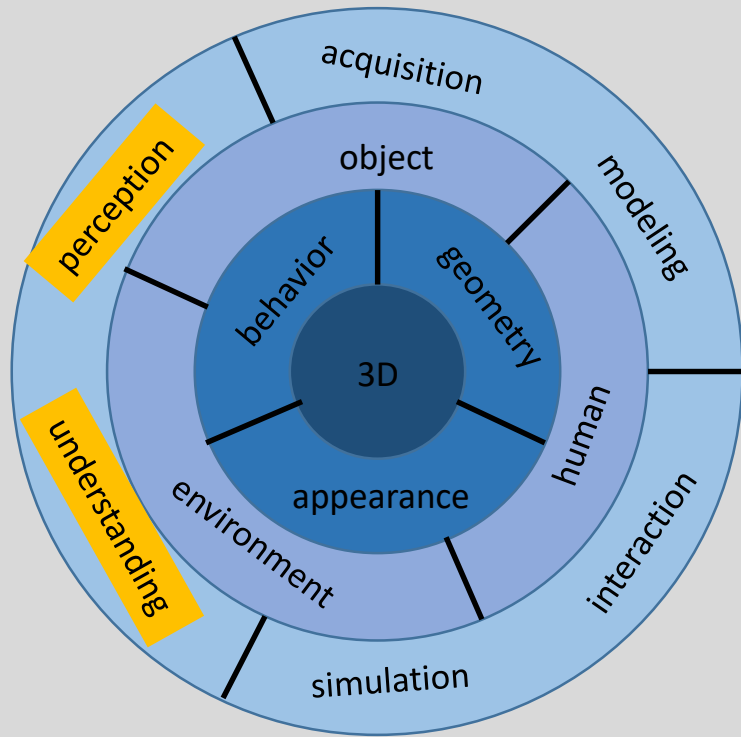
Face shape & dynamics
(Kun, Feng, Libin, Jinxiang, MSRA)



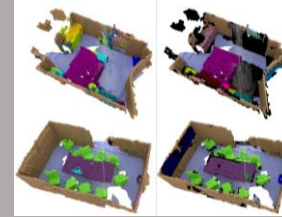
Dynamics and shape from 3D scan
(Tianjia)

Techniques

More and more 3D perception & understanding



3D shape analysis
(Hao Su, ShapeNet)



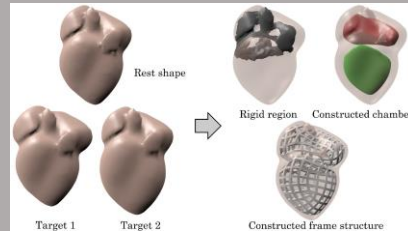
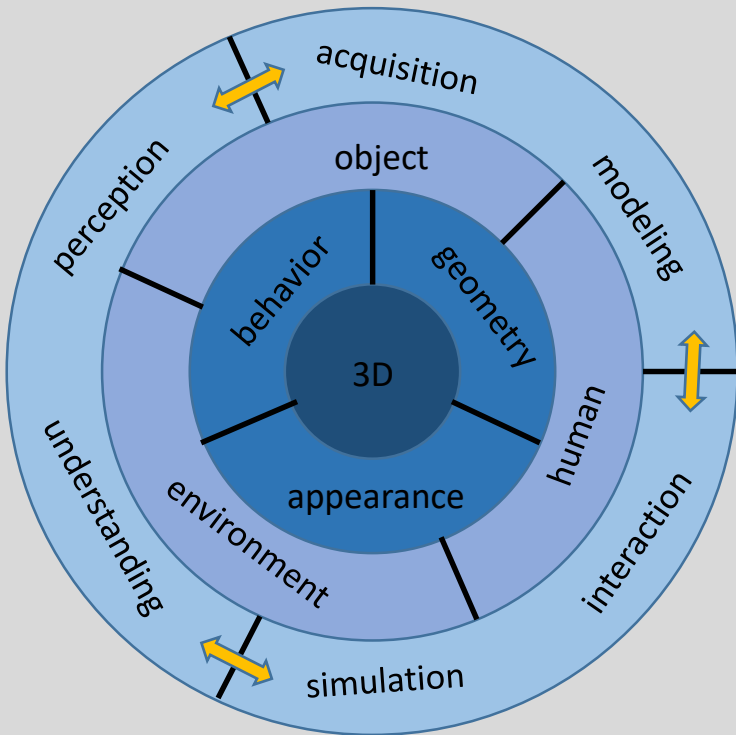
3D scene segmentation
(ScanNet)



3D pose/hand recognition

More and more perception & understanding

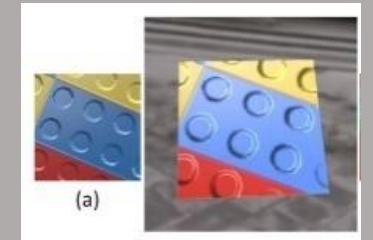
From separate technique to mixture



Computational fabrication
Using simulation for shape modeling (Yizhong, Kun, Ligang, Lin Lv)



3D modeling from single image
Using perception for shape modeling (Hao)



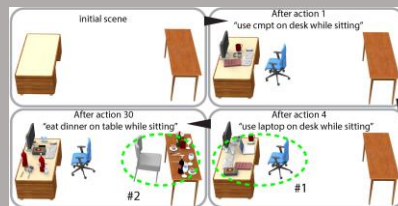
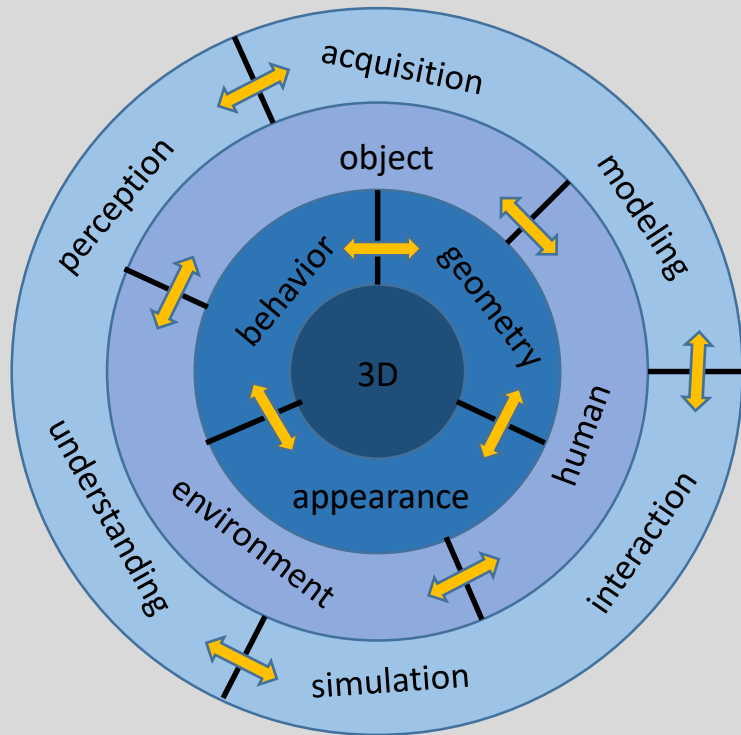
Appearance perception from rendering/simulation (Yue)

Techniques

More and more perception & understanding

From separate technique to integration

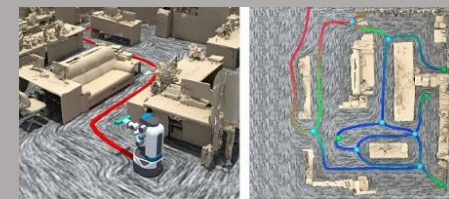
From physics/geometry to functions/relationships



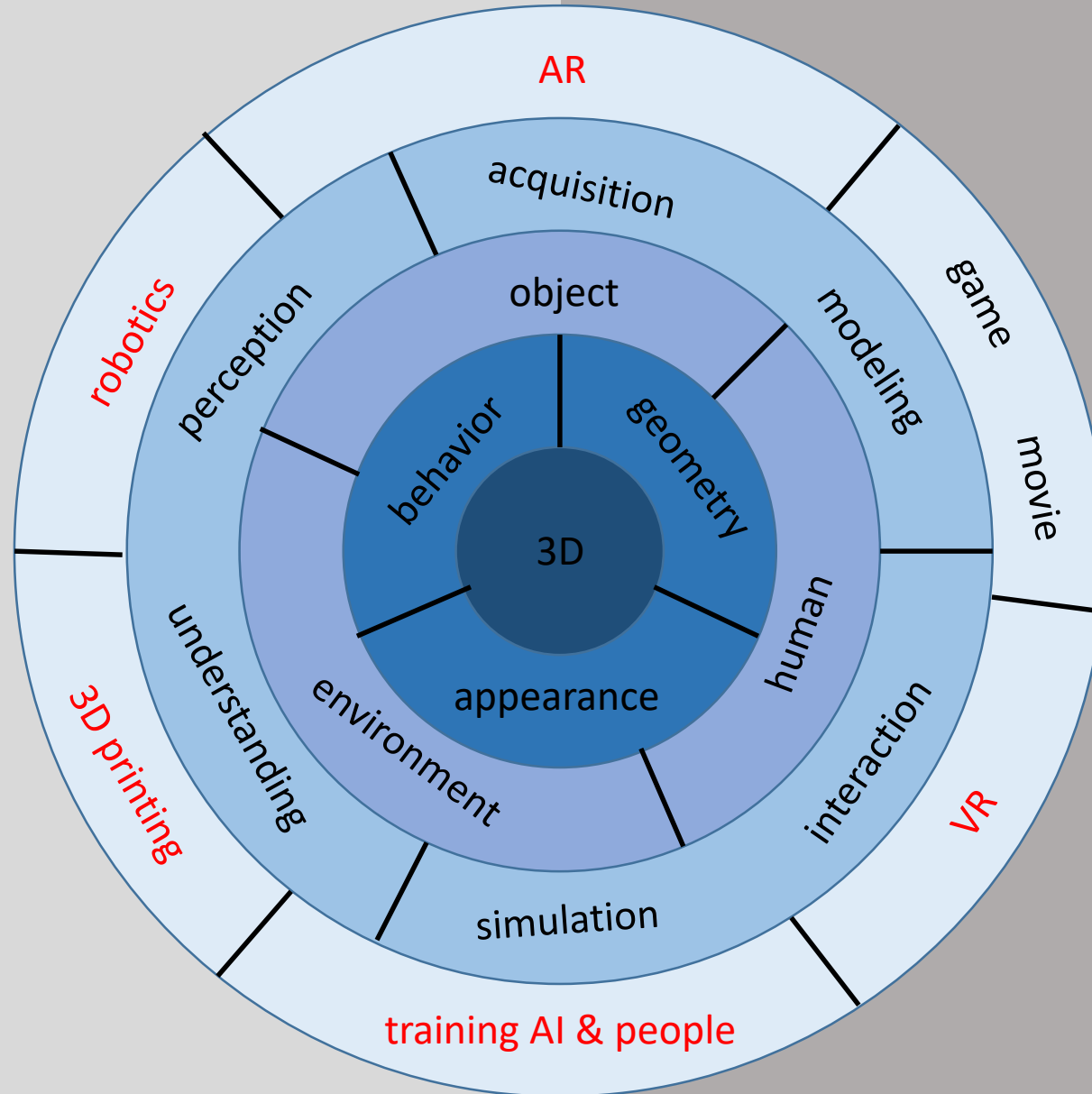
Action driven scene modeling evolution. Using human behavior for environment layout



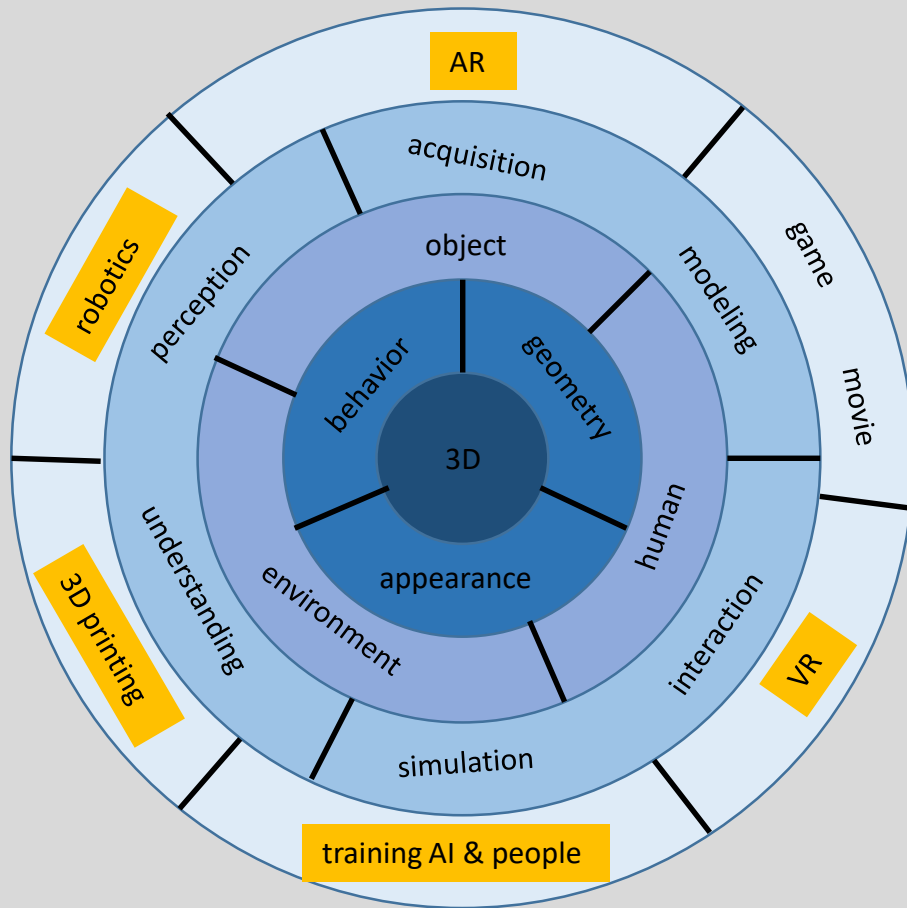
Function from interaction analysis. Human object interaction for shape modeling (Ruizhen, Hui Huang)



Autonomous scene reconstruction. Combine robot motion and scene reconstruction (Kevin Xu)



Applications



VR

- An new kinds of interactive media
- Extension of traditional graphics

AR

- Integrate the virtual world info into real world
- 3D scene perception and understanding is key

Robotics

- Real time simulation and interaction is key
- 3D scene perception and understanding is key

Training AI & people

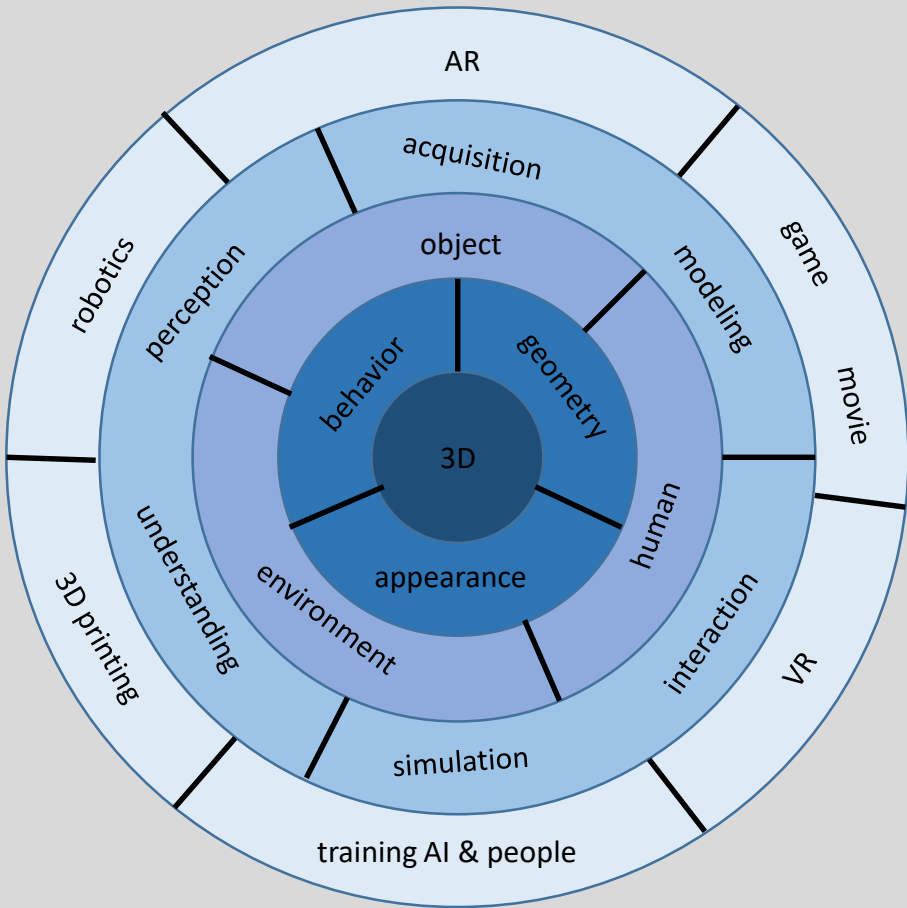
- Integrate real world info into virtual world
- Environment modeling and simulation is key

3D printing

- Simulation is key

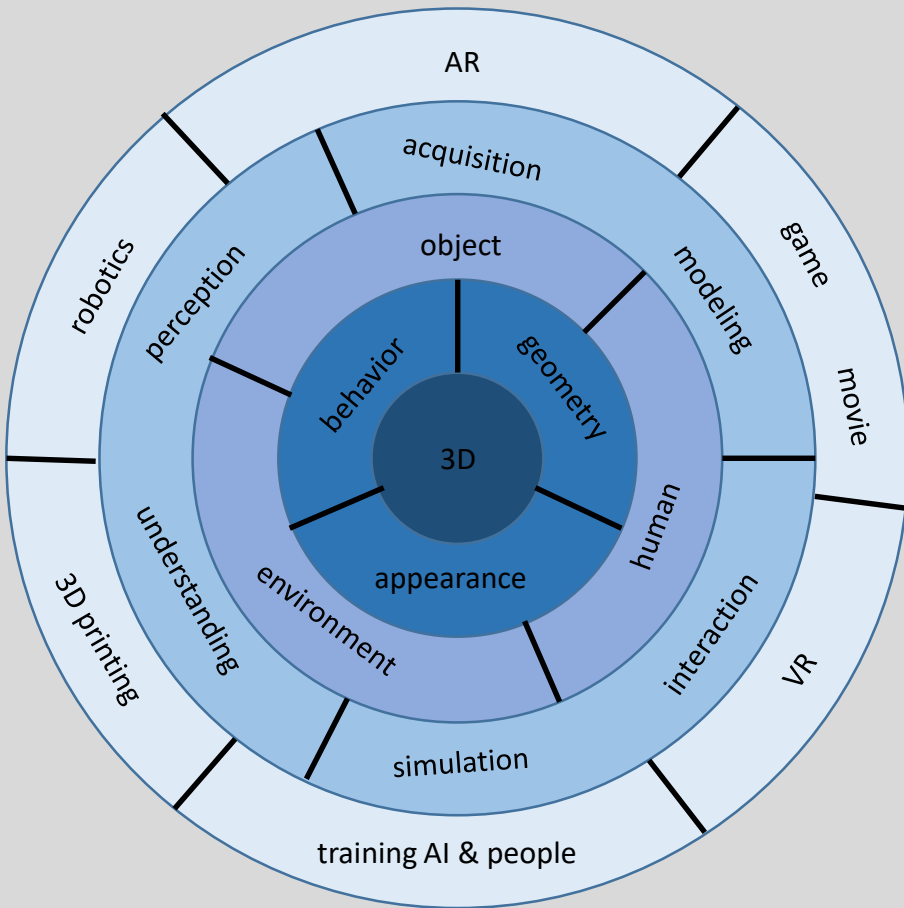
Future of 3D Visual Computing?

Rethinking the Real and Virtual



	Virtual Environment	Virtual Human	Virtual Object	Virtual Information
Real Environment	AI Training?	Robotics	Mixed Reality	AR
Real Human	VR	Telepresence	Mixed Reality	InfoVis
Real Object	Object digitization	Telepresence, Robotics	Mixed Reality	AR
Real Information (text, speech, sensing data)	IOT	?	?	AR

Rethinking 3D Graphics



From Physics/Geometry to Relationship/Function to Task

- From geometry/appearance centered to task centered (Songchun Zhu)

Tasks (fluent)

Functions/Relations/Interactions

Physics and Geometry

Taking human intention and user input in

- Modeling user intention/input in our graphics task

The best way to predict the future is to implement it!

Acknowledgements

- My colleagues
 - Yue Dong, Yang Liu, Muscle Wu, Hao Pan, Guojun Chen, Yizhong Zhang...
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 - Yunhe Pan, Hujun Bao, Baoquan Chen, Shimin Hu, Songchun Zhu...

Thanks!