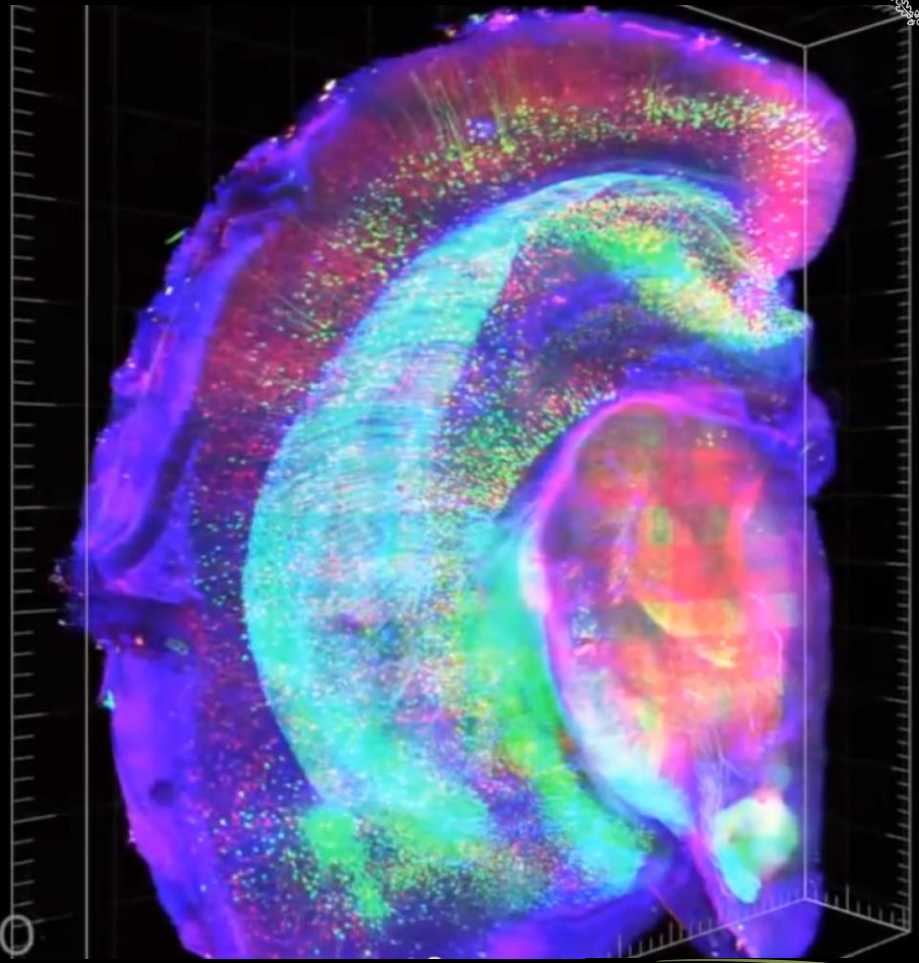
Visualization 2014 – Lecture 3: VisIt and Scientific Visual Storytelling

Mario Romero – 2014/04/01



See-through brains

Published on Apr 10, 2013

Scientists have come up with a way to make whole brains transparent, so they can be labelled with molecular markers and imaged using a light microscope. The technique, called CLARITY, enabled its creators to produce the detailed 3D visualisations you see in this video. It works in mouse brains and human brains; here the team use it to look into the brain of a 7-year-old boy who had autism.

nature video

KTH VETENSKAP OCH KONST

VICSTHLM VISUALISATION INTERACTION COLLABORATION

Prelude Videos

JoAnn Kuchera-Morin:

Stunning data visualization in the AlloSphere

TED2009 · 6:27 · **Filmed** Feb 2009
Subtitles available in 25 languages

View interactive transcript

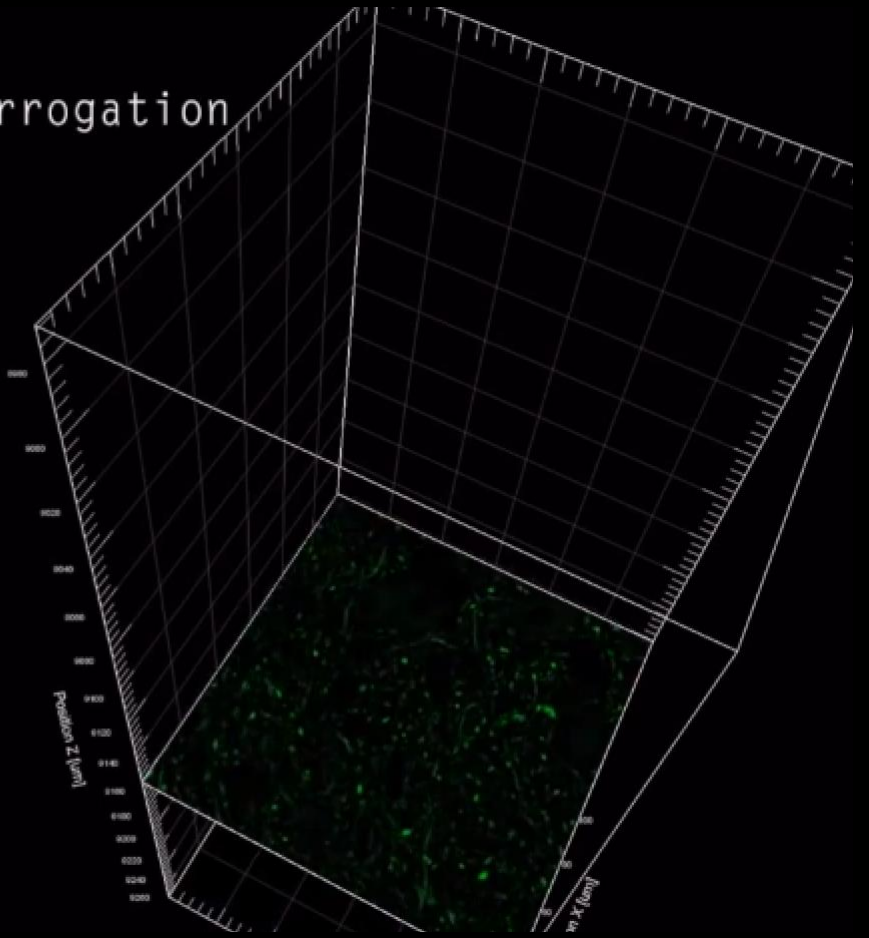
Prelude Videos

Structural and molecular interrogation
of intact biological systems

Nature, 10 April 2013
doi:10.1038/nature12107

3D visualisations © Karl Deisseroth &
Kwanghun Chung, Stanford University

Music: Tom Quick, Audio Network



Schedule

L1	Tue	25 mar 08:00-10:00	Introduction	
L2	Thu	27 mar 15:00-17:00	Why Visualization, Visualization Pipeline	
L3	**Tue**	**1 apr 08:00-10:00**	**VisIt Pipeline, Scientific Visual Storytelling**	**P1**
L4	Tue	8 apr 08:00-10:00	VMD Pipeline, Group formations	P2
L5	Tue	15 apr 08:00-10:00	Volume Rendering	P3
L6	Tue	22 apr 08:00-10:00	Proposals	P4.1
L7	Tue	29 apr 15:00-17:00	“Hello World”	P4.2
L8	Tue	6 may 08:00-10:00	Update 1	P4.3
L9	Fri	9 may 15:00-17:00	Update 2	P4.3
L10	Tue	13 may 08:00-10:00	Update 3	P4.3
L11	Thu	15 may 15:00-17:00	Final Demo	P4.4
	Thu	22 may 23:59	Webpage Report	P4.5

Outline

1. Subject Header: ”VIS14”
2. Previously on VIS14
3. Inverted Classroom
4. Discussing Readings
5. Presenting VisIt
6. Readings for Lecture 4
7. Project 2

PREVIOUSLY ON IVIS14

RÖSTA

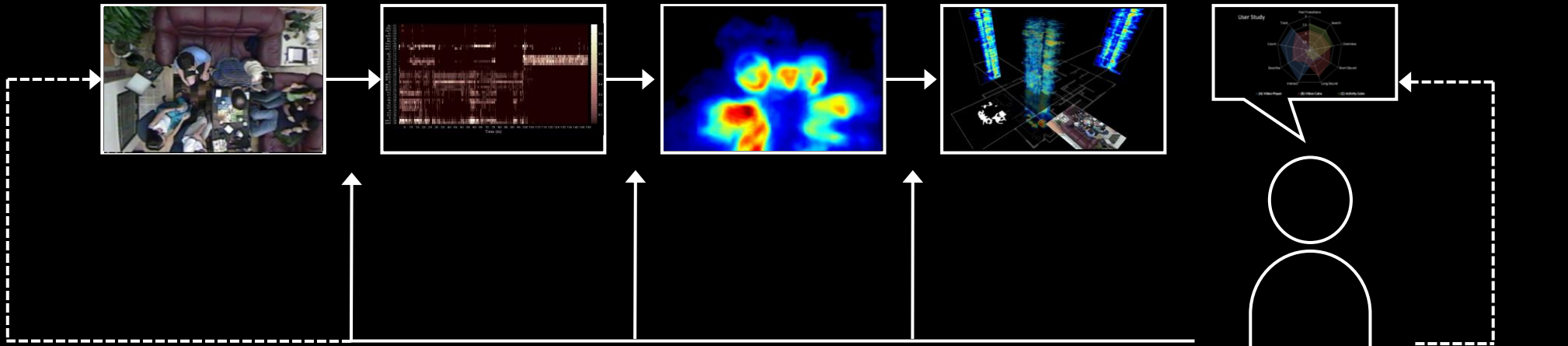
ENS VAL

bidrag har chans att vinna i specialkategorin Publikens val. Inför galan kommer det att
rit här på cawards.se. Publikens val är en utmärkelse där man förutom ära och berömm
liseringscenter C.

ÄR!

Visualization Pipeline

expanded from **Readings in Information Visualization: Using Vision to Think**
By Stuart K. Card, Jock D. Mackinlay, Ben Shneiderman, 1999



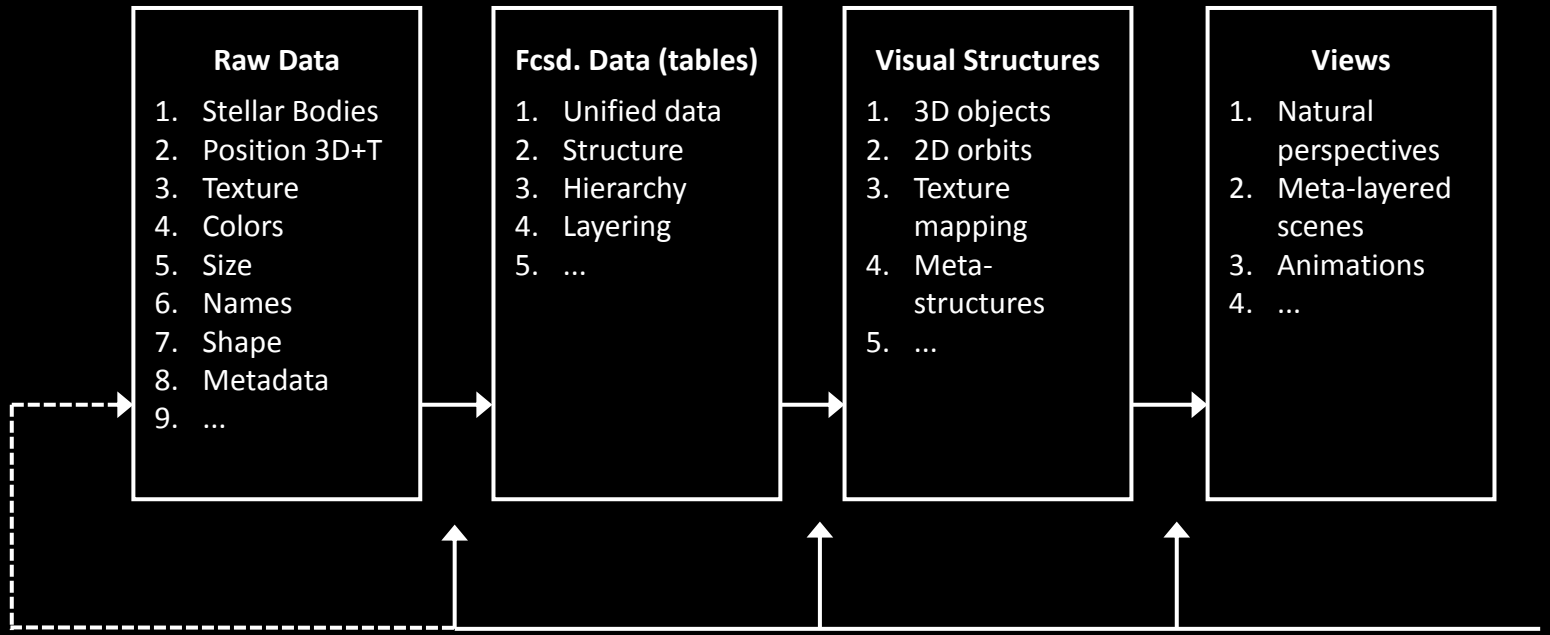
Task : Uniview Pipeline

1. Fill in the stages of the Visualization Pipeline for Uniview

Answer the following questions

1. Who is the user?
2. What are the tasks?
3. What is the data?
4. What are the data transformations?
5. What are the visual mappings?
6. What are the visual structures?
7. What are the view transformations?
8. What are the views?
9. How does the demo support the tasks?
10. How can it be improved?

Uniview Visualization Pipeline



Source:

1. NASA
2. Observatories
3. Papers
4. Models
5. Simulations
6. Real-time
7. ...

Data transformations:

1. Level information
2. Unifying – YEAH!!!
3. Translations
4. ...

Visual mappings:

1. Space to space
2. Shape to mesh
3. Metadata to text
4. Metadata to layers
5. ...

View Transformations:

1. Rotation
2. Translation
3. Zoom
4. Layering
5. Targeting
6. Animating

Users:

1. Us
2. Planetariums
3. Teachers
4. Schools
5. Astronomers
6. …

Evaluation:

1. Think aloud
2. …

INVERTED CLASSROOM

FLIPPING THE CLASSROOM

How Will You Reverse Instruction?

Reading Discussions

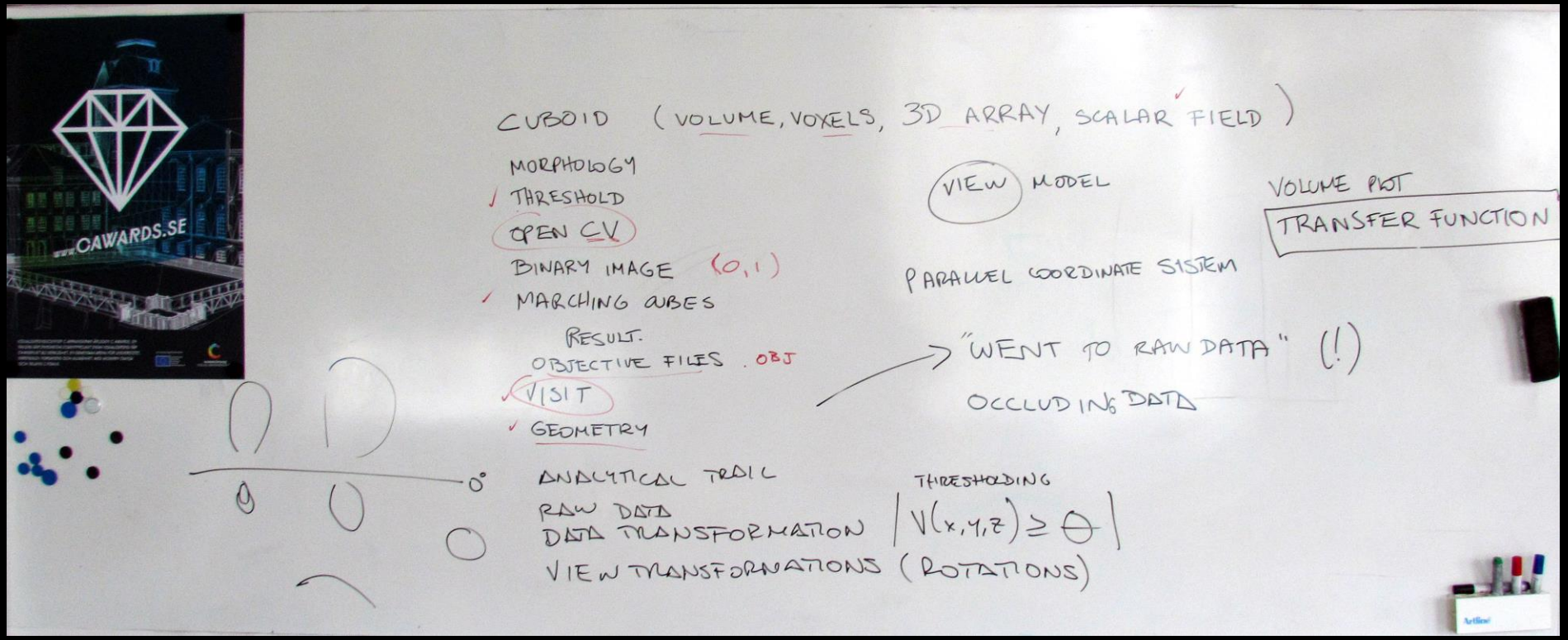
1. Split into groups of four
2. Discuss the readings – 20 minutes
3. Raise the three most important points per paper
4. Create two slides
5. Present – 5 minutes

VISIT

Teach me VisIt

1. Show me your projects
2. What did you learn?
3. What would you like to continue learning?
4. Let’s teach!

Discussion


CUBOID (VOLUME, VOXELS, 3D ARRAY, SCALAR FIELD)
MORPHOLOGY
THRESHOLD
OPEN CV
BINARY IMAGE (0,1)
MARCHING CUBES
RESULT.
OBJECTIVE FILES .OBJ
VISIT
GEOMETRY
ANALYTICAL TRAIL
RAW DATA
DATA TRANSFORMATION
VIEW TRANSFORMATIONS (ROTATIONS)
VIEW MODEL
PARALLEL COORDINATE SYSTEM
"WENT TO RAW DATA" (!)
OCCLUDING DATA
VOLUME PLOT
TRANSFER FUNCTION
THRESHOLDING
V(x,y,z) ≥ Θ

Readings for next class (L4)

- **Introduction to Scientific Visualization, Chapter 3,** Models and Software
  - Helen Wright
  - LINK
  - Write 100-word summary and bring it to next class.
- Humphrey, William, Andrew Dalke, and Klaus Schulten. "VMD: visual molecular dynamics." *Journal of molecular graphics* 14.1 (1996): 33-38.
  - LINK
  - Write 100-word reflection on how you will use this reading in project 2.
- **Send a PDF with both reflections to marior@kth.se by next Monday 7/4 at 23:59. Use "VIS14 – Reading L4" on the headline of the subject.**

Project 2

- VMD
- Project Description

Thank you!

marior@kth.se