A Classification Framework for Interactive Digital Artworks

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UCMedia 2010

Abstract

- Interactive Digital Artworks (IDAs)
- Previous work
- Our classification framework
- Comparison with previous work
- Validation
- Conclusions

Interactive Digital Artworks (IDAs)

- ❑ Artworks where digital technology is an essential component
- ❑ Spectators are involved in the production of artistic output

- ❑ Digital videos or digital music pieces are not IDAs, unless the user is involved
- ❑ Can be physical works ("installations") or virtual works

Our Goals

❑ Characterization of IDAs
    (examples from fine arts)
    ❑ What is Leonardo's "Monna Lisa"?
       ❑ It is an oil on canvas
    ❑ What is Leonardo's "Last Supper"?
       ❑ It is a fresco on wall

❑ Comparison of IDAs
    (examples from fine arts)
    ❑ Are Michelangelo's and Donatello's "David" artworks of the same kind?
       ❑ Michelangelo's "David" is a marble sculpture
       ❑ Donatello's "David" is a bronze sculpture

Why a classification is useful

- Management
- Preservation

- Economics
- Copyright

- Discussion

- Production
- Teaching
- Research

How

- ❑ Definition of a classification framework
  - ❑ A set of homogeneous categories

- ❑ Example of classification in fine arts:
  - ❑ Painting techniques (oil, watercolors, fresco, …)
  - ❑ Materials (paper, wood, …)
  - ❑ Tools (brush, pencil, …)
  - ❑ …
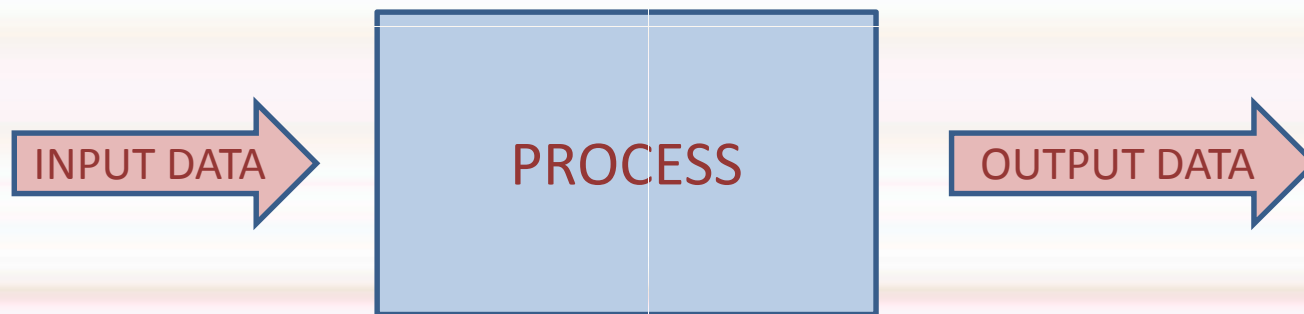
Approach

❑ Founded on the view
A Digital Artwork is an Information Processing System

(B.Oates, EJIPS, 2006)

❑ Based on literature review of

- ❑ Previous classification frameworks
- ❑ Description of existing IDAs

❑ Validated by application to real-life IDAs

Classification: Foundations

❑ An IDA as an Information Processing System

| INPUT DATA → | PROCESS | OUTPUT DATA → |

❑ The process may be seen also as a mathematical function $y = f(x)$

Previous Classification Frameworks (1)

- ❑ Sommerer and Mignonneau (1999)
    - ❑ Focusing on user interaction
    - ❑ Not requiring Information Technology

- ❑ Hannington and Reed (2002)
    - ❑ Interaction in multimedia applications
    - ❑ Not focused on works of artistic nature

Previous Classification Frameworks (2)

- ❑ Edmonds, Turner, and Candy (2004)
  - ❑ Discusses relations between artwork, artist, viewer and environment
  - ❑ Does not cover internal aspect of artworks

- ❑ Trifonova, Jaccheri, and Bergaust (2008)
  - ❑ Focusing only on interactive installations
    - ❑ Physical installations
    - ❑ Considering only interactive aspects

Classification: Dimensions

- **Content Provider**: who produces the raw data processed by the IDA
- **Processing Dynamics**: which kind of variability has the processing itself
- **Processing Contributors**: which are the sources affecting the processing, i.e. altering the basic behavior of the processing function

Content Provider values

- **Artist**: the person or team who has invented and realized the IDA
- **Audience**: the human beings actively and consciously interacting with the IDA
- **Environment**: any passive or not-conscious entity present in the environment surrounding the IDA

More than one value is possible

Processing Dynamics values

❑ **Static**: the processing function does not change with the passing of time

❑ **Dynamic – predefined change**: the processing function changes in the way predefined by the author

❑ **Dynamic – casual change**: the changes have a random component (even if within a pre-defined domain)

❑ **Dynamic – evolutionary change**: the changes are evolutionary (in the biological sense) hence un-predictable

Processing Contributors values

- **Artist**: elements altering the basic behavior of content processing function are self-contained in the IDA
- **Audience**: human beings actively and consciously provide elements to alter the basic behavior of the content processing function
- **Environment**: elements are provided by the context where the IDA is placed

More than one value is possible

All inputs are equal under the sun…

- … from a mathematical viewpoint, but …
- Input elements classified as Processing Contributors are parameters altering the basic way the raw material (Content) is changed by the processing function
- This is an important conceptual distinction from the artist's viewpoint
  - Content is what the artist has designed into the IDA
  - Contribute is what alters the basic behavior of the IDA's processing function

Example: 15 seconds of fame

- ❑ Computer detects human faces in visitor' image taken by the camera, transforms it (with a randomly selected effect among the pre-defined ones), displays it for 15 seconds.
- ❑ Content Provider:
  - ❑ audience
- ❑ Processing Dynamics:
  - ❑ pre-defined change
- ❑ Processing Contributors:
  - ❑ artist

Solina et al., ICARCV'02

Example: Sonic Onyx

❑ Gets texts, images and sound files from audience, converts them into sounds played through speakers located in the arms. The globe changes its color according to the different sounds.

❑ Content Provider:
  ❑ audience
❑ Processing Dynamics:
  ❑ casual
❑ Processing Contributors:
  ❑ artist

Ahmed et al., ArtsIT'09

Comparison (1)

		Content Provider			Processing Dynamics				Processing Contributors		
		Artist	Audience	Environment	Static	Predef. change	Casual change	Evolut. Change	Artist	Audience	Environment
S M	Pre-designed	X	O		X	O			O	X	
	Evolution.	X	X		O	X	X	X		X	O
H R	Passive	X			X		O		X	O	
	Interactive	X	O		X		O			X	
	Adaptive		X			X	O			X	
E T C	Static	X			X				X		
	Dynamic passive			X	X	O					X
	Dynamic interactive		X		X	X				X	X
	Dynamic varying		X	X	X	X	X			X	X

Classifications by Sommerer and Mignonneau (1999), Hannington and Reed (2002), Edmonds, Turner and Candy (2004)

Comparison (2)

		Content Provider			Processing Dynamics				Processing Contributors		
		Artist	Audience	Environment	Static	Predef. change	Casual change	Evolut. Change	Artist	Audience	Environment
Interact Rules	Static				X						
	Dynamic					X	X	X	O	O	
Trigger. Param.	Human Presence		O						O	X	
	Human Action		O						O	X	
	Environm.			O					O		X
Content Origin	Pre-defined	X			O	O	O		X		
	User Input		X		O					X	
	Generat./ Algorithm.	O				O	O	X	X		

Classification by Trifonova, Jaccheri, and Bergaust (2008)

Validation: the process

- ❑ Considered 54 art installations in Italy, classified under the framework of Trifonova, Jaccheri, and Bergaust (2008)
- ❑ All of them were Interact.Rules:static under their framework
  - ❑ We do not have this weakness

	Content Provider	Processing Dynamics	Processing Contributors	Other Installations
8	Artist	Static	Artist	21, 22, 23, 24, 28, 43, 44
10	Artist	Static	Audience	3, 4, 11, 17, 18, 20, 25, 26, 35, 36, 39, 40, 47, 48, 49, 50, 51, 52, 53, 54
41	Artist	PD/C change	Artist	6
16	Artist	PD/C change	Audience	1, 7, 12, 27, 29, 32, 33, 34, 38
45	Artist	Static	Artist Environment	
19	Artist	Static	Audience Environment	
31	Artist	PD/C change	Artist Audience	
42	Audience	Static	Artist	
46	Audience	PD/C change	Artist	
15	Audience	PD/C change	Audience	3, 30
14	Artist Audience	Static	Artist	
13	Artist Audience	PD/C change	Artist	37
2	Artist Audience	PD/C change	Audience	
9	Artist Environment	Static	Artist	

Validation: issues

- We never used the label
  Processing Dynamics: evolutionary change
  - This kind of installations is rather difficult to build
- Framework is too coarse:
  - 2nd row has almost one half of all installations
  - $1^{st}+4^{th}$ rows have almost one third of them
- Consider also the sensory/physical channel through which interaction happens (sound, light, gesture, pressure, touch, …)
- Only 14 different classes (categories) were used in our framework

Conclusions

- ❑ Classification framework for Interactive Digital Artworks
- ❑ The first approach to be based on Input-Process-Output view of an artwork as an Information Processing System
- ❑ Validated by application to 54 real-life IDAs
- ❑ Extension to consider the sensory channels through which interaction happens
- ❑ Further validation with more IDAs