The Best Interactive System is a Non-Interactive System

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Examples of Interactive Media Systems
A dog leash that draws the finishing line.

77 Awards and more than 200 selections
Written & Directed by Victor Carrey
victorcarrey.com

Screenshot from vimeo.com
Other Examples:

- free viewpoint video
- maps / huge images
- 3D teleimmersive system
- volume visualization
What is common among them?
Media data occupies an $n$-dimensional space
A viewpoint sits in the n-dimensional space
A view is a region of space visible from the viewpoint.
Interaction controls a path of viewpoints over time
(the path need not be continuous)
For a non-interactive system, the path is fixed.
Video on Demand
1D (time)
Google Street View
2D (long, lat)
Free viewpoint video

2D (angle, time)
Virtual Earth
3D (long, lat, height)
Zoomable Video

4D (x, y, zoom, time)
Why Interact?
1. Too much data to display / perceive at one time
Sometimes too much data to download quickly as well
Interactive Media Streaming
how to keep interaction delay low?
a. Use a closer server
b. Use caching proxy
c. Use peer-to-peer
d. Prefetch data
Caching is challenging since nearby clients may follow different paths
P2P Interactive Media Streaming

Client

Peer

Peer

Peer
Content discovery is challenging since peers likely follow different paths.
Prefetching is challenging since the path the client follows can change.
Hypothesis: the path depends on the content, context, and user habits.
Idea: learn from access patterns to predict a path
With great **freedom** comes **great uncertainty**
idea: limit the freedom of interaction or guide the interaction
Video on Demand

1D (time)

Google Street View

2D (long, lat)
(along fixed path)
are easier to predict than
How to limit / guide interaction?
Why Interact?

1. Too much data to display / perceive at one time
2. To access data they are interested in
How to limit / guide interaction?

Simplify access to data users might be interested in.
Landmarks or SLurls in Second Life

credit: moonflowerdragon
Issues:
1. too many?
2. may not be interesting?
3. interestingness change?
Challenge: automatically determine the interesting viewpoints
idea: analyze content to find the interesting viewpoints (e.g., faces, goals, etc)
content analysis works to a certain extent ..
many viewers want to zoom into here instead
The path depends on the content, context, and user habits.
Idea: learn from access pattern to identify “hotspots”
TP Nghiem, A. Carlier, G. Morin, and V. Charvillat. "Enhancing Online 3D Products through Crowdsourcing." CrowdMM’12
Image from Nghiem et al
Highlight interesting viewpoint ->
Allow direct access ->
Reduce interaction   ->
Interaction becomes more predictable ->
Better caching/prefetching ->
Lower interaction delay ->
Better interaction system
Highlight interesting viewpoint ->
Allow direct access ->
**Reduce interaction** ->
Interaction becomes more predictable ->
Better caching/prefetching ->
Lower interaction delay ->
**Better interaction system**
Could the best interactive system be a non-interactive one?
User interacts because there are more data than can be displayed/perceived and user wants to **view interesting data**
What if we show what is interesting to users without them interacting?
Challenge: automatically determine the interesting path
as well as many others in automatic camera navigation in 3D environments
Challenge:
In what order do we visit the interesting viewpoints?
Challenge:
how to construct a smooth path between these viewpoints?
Challenge:
how to quickly react to manual override?
Concluding Messages
Restricting / guiding user interactions is useful

(how does your system do this?)
Interaction can improve passive consumption

(can your system exploit this?)
Passive-consumption-only is possible (how can your system achieve this?)
Interaction can reduce interaction delay.

Learn from interaction history to limit interaction freedom.

Reducing interaction freedom can reduce interaction delay.
Thank You
(interaction time!)