Zoetrope: Interacting with the Ephemeral Web
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The Dynamic Web

The Now Web
See the web through a browser of "now"
Access services through an index of "now"

Temporally insensitive
(ignores temporal context and historical values)

Is this really a good price?
Is this really a good price?

When is really the right time to buy?

What is the relationship between weather and traffic in Seattle?

What is the relationship between traffic and temperature in Seattle?

an alternative...
Related Work

• Evolution of the Web
  [Fetterly et al., WWW '03]
  [Ntoulas et al., WWW '04]

• Internet Archives

Related Work

• Evolution of the Web
• Monitoring
  [Sugiura & Koseki, UIST '98]
  [Greenberg & Boyle, GI '06]

Our Approach

• Evolution of the Web
• Monitoring
• Clipping & Aggregating
  [schräfel et al., WWW '02]
  [Dontcheva et al., UIST '07]
Zoetrope Architecture

- Zoetrope Front End
- Zoetrope Engine
- Data Store: XML/Images/Text/…
- Crawler
- Web

Content Streams & Operators

- Input: Content Stream
  \{...<T_i, C_i>...\}
- Transform Operator
- Filter Operator
- Render Operator
- Output: Content stream with modified data payloads (C'_i)

- Content Streams & Operators
  \{...<T_i, C_i>, <T_{i+1}, C_{i+1}>, ...\}
- Time stamp
- Content (typed, but can be anything: HTML, images)

Construct everything from operators

- Lens, locked to coordinate
- Generate Images
- Crop to Rectangle
- Pick image based on slider
- Render into lens

6/8/09
Construct everything from operators

\[
\{ \langle T_i, C_i \rangle \} \quad \text{Select DOM forest} \quad \text{Render into time series}
\]

Visual (same place on screen)

Structural (same place in HTML)
Content (same text)

Filters

RENDERERS
Contributions

- Visual programming toolkit for temporal Web content
- Semantics for temporal data streams
- Operators for fast processing of temporal data streams
- Indexing structures for fast processing and interaction with Web content over time

Future Work

- Evaluation
  - User Study
  - Performance

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Information Arbitrage

- Combine observations to improve granularity
Future Work

- Evaluation
  - User Study
  - Performance
- Data gathering
- Scaling up

Possible Distributed Architecture

- Server collects snapshots
- Client collects finer resolution
  - Gaps?
- DHT for collected data (good for intervals)
- Query: operator chain + data
  - Release on similarity
  - Repeat

Thanks!

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