

What are People Doing?

Interactive Behavior Visualization Tools

Michael Zentner, Nathan Denny, Gerhard Klimeck,
Ken Musselman, George Bunch Adams III

What are People **Really** Doing?
What Do Their Activities Mean?

Interactive Behavior Visualization Tools

Michael Zentner, Nathan Denny, Gerhard Klimeck,
Ken Musselman, George Bunch Adams III

Cloudburst on nanoHUB Tools



Behavior Visualization Goals

- Visual Evidence
- Interactive Discovery

- Applicability
 - ◆ Behavior of HUB users
 - ◆ Behavior of subjects in research studies

Interactive Visualization Tools

Aubice

- Uses
 - ◆ Bulk correlation
 - ◆ Discrimination
 - ◆ Textual patterns
- Availability
 - ◆ Commercial Product
 - ◆ Offered as service to HUBs

“Interactive Dashboard”

Cloudburst

- Uses
 - ◆ Detailed characterization
 - ◆ Temporal exploration
 - ◆ Visual validation of statistics
- Availability
 - ◆ Purdue developed
 - ◆ Will be offered in source code

“Visual Activity Log/Filter”

Examples

- nanoHUB Usage
- Hospital Patient (Re)Admissions

Correlation with Aubice

- For patients admitted to the hospital:
 - ◆ Diagnosed with displaced vertebral disc
 - ◆ What are the most common procedures performed?



Currently Exploring - BC Readmissions Patients

Refresh

Details

Histograms

Sort: Alpha Numeric

Categories 0 item(s)

No results for current query.

Drop Labels

Segments

Current Stack: (none)

Segment 1 Clear 0

ALL

Visualizer OFF 0 item(s) Clear

Keywords 0 item(s)

No results for current query.

Drop Labels



Categories

- Expand All
- Categories
 - Readmissions
 - Cumulative Admissions
 - APR DRG
 - Admission Age
 - Admission DOW
 - Admission Type
 - Admitting Physician
 - Attending Physician
 - Consulting Physician
 - DRG
 - Days on Ventilator
 - Discharge DOW
 - Discharge Disposition
 - Disease Severity Index
 - Hospital ID
 - Hospitalists
 - In/Out Code
 - Length of Stay
 - MS DRG
 - Marital Status
 - Next Admission Length
 - Payer Class
 - Primary Care Physician
 - Principal Diagnosis
 - Principal Procedure
 - Source of Admission
 - Demographics
 - Totals
 - Keyword

Discrimination with Aubice

- Are graduate and undergraduate students using different computational tools on nanoHUB?



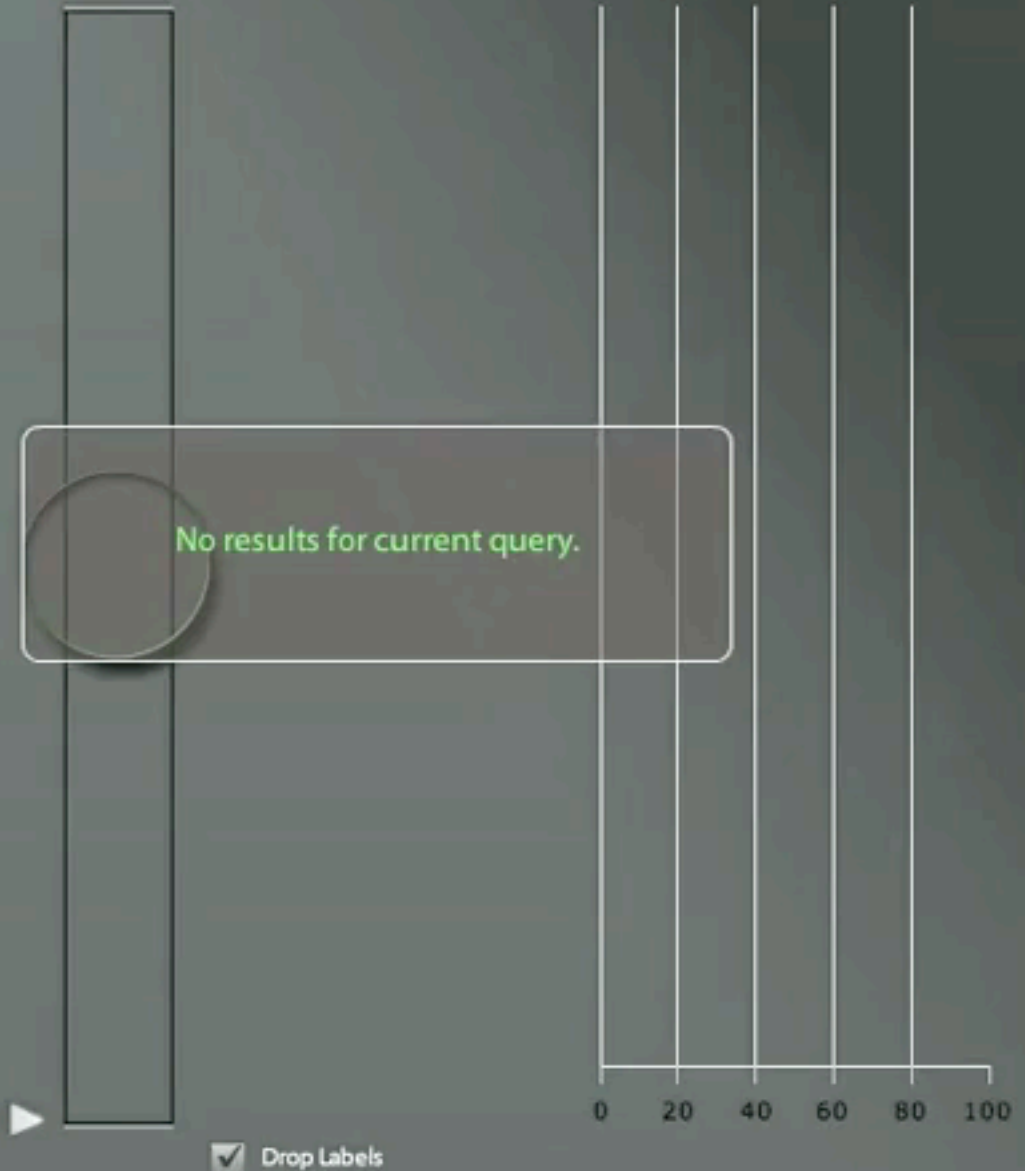
Currently Exploring - User Profile 2/8/2011

Refresh

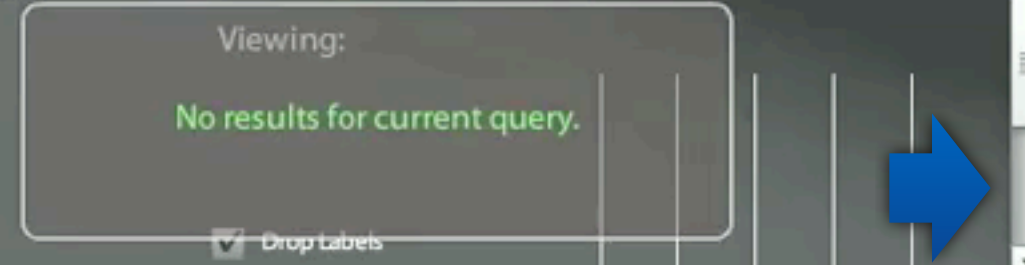
Details

Histograms Sort: Alpha Numeric

Categories 0 item(s)



Keywords 0 item(s)



Undergrad Tool

Graduate Tool

Undergrad Tool

Graduate Tool



Hide Categories

Categories

Expand All

- Categories
- Nanohub User Profile
 - Clusters
 - Demographics
 - Information
 - Usage
 - Keyword

Segments Add Reset Load Save

Current Stack: (none)

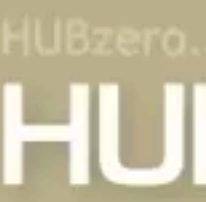
Segment 1



Visualizer Clear

Temporal Behavior with Cloudburst

- What does the hospital visitation behavior of asthmatics look like?



Favorite applications

Hub! [minimize] [maximize] [close] #1 #2 #3





Cloudburst - HUB edition

Include histories with any of these tags...

- 492.0
- 492.8
- 493.00
- 493.01
- 493.02
- 493.12
- 493.20
- 493.21
- 493.22
- 493.81
- 493.82
- 493.90
- 493.91
- 493.92
- 494.0
- 494.1
- 495.9

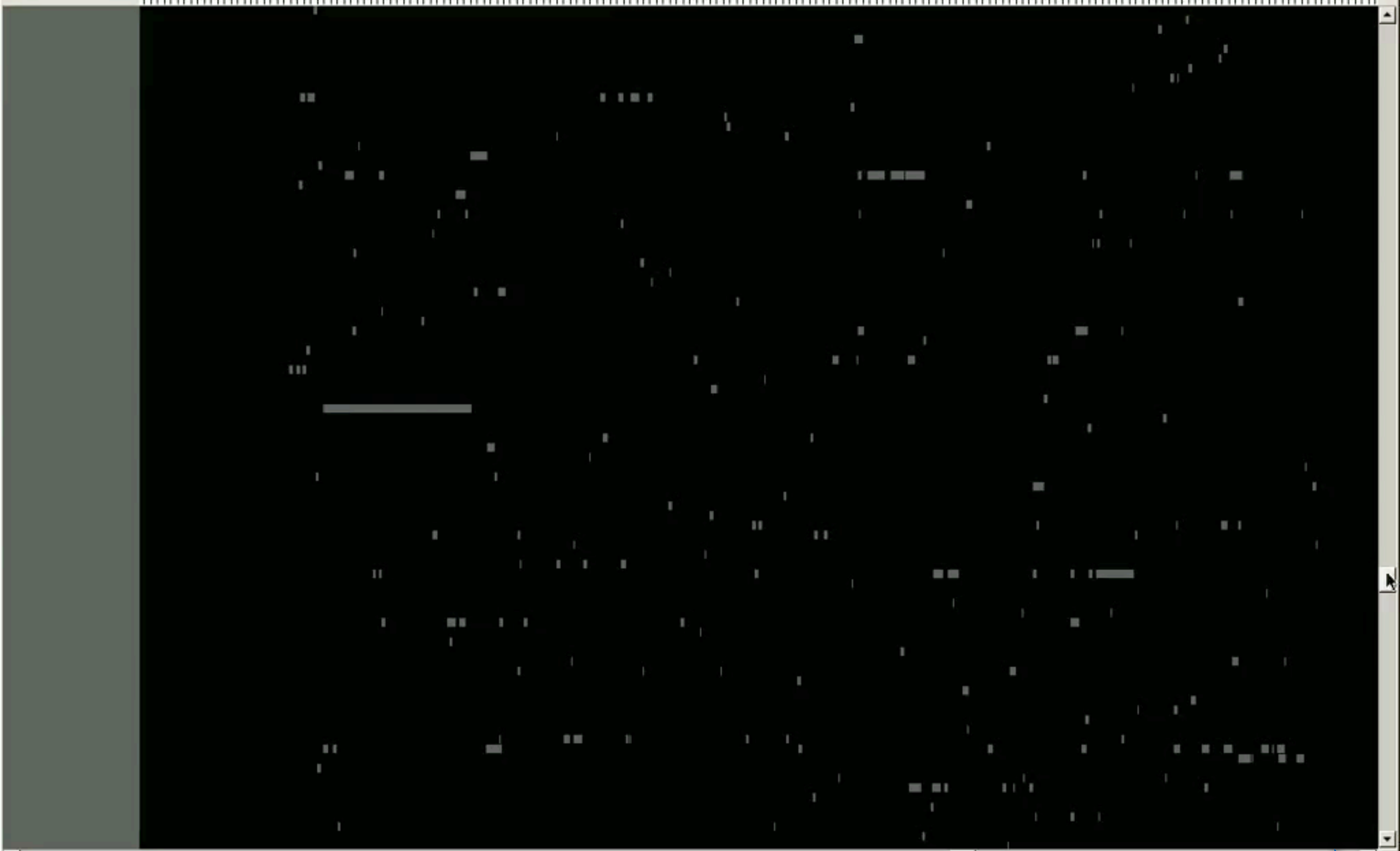
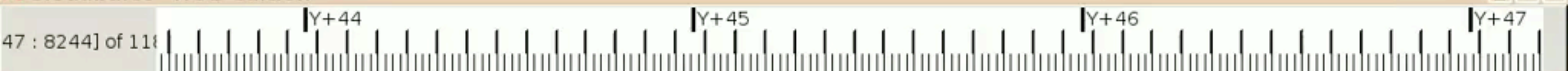
- code/diagnosis/460-519/493.00
- code/diagnosis/460-519/493.01
- code/diagnosis/460-519/493.02
- code/diagnosis/460-519/493.12
- code/diagnosis/460-519/493.20
- code/diagnosis/460-519/493.21
- code/diagnosis/460-519/493.22
- code/diagnosis/460-519/493.81
- code/diagnosis/460-519/493.82
- code/diagnosis/460-519/493.90
- code/diagnosis/460-519/493.91
- code/diagnosis/460-519/493.92



except those histories with any of these tags

Temporal Behavior with Cloudburst

- How many of these admissions are related to asthma?



Start! Select... Sort... Style... See... Snapshot? Save?



- 488
- 488.0
- 488.1
- 490
- 491.0
- 491.1
- 491.20
- 491.21
- 491.22
- 491.8
- 491.9
- 492.0
- 492.8
- 493.00
- 493.01
- 493.02
- 493.12
- 493.20
- 493.21
- 493.22
- 493.81
- 493.82
- 493.90
- 493.91
- 493.92
- 494.0
- 494.1
- 495.9
- 496
- 500
- 501

- ✘ patient/sex/female
- ✘ patient/sex/male
- ✘ admission/code/diagnosis/460-519/493.00
- ✘ admission/code/diagnosis/460-519/493.01
- ✘ admission/code/diagnosis/460-519/493.02
- ✘ admission/code/diagnosis/460-519/493.12
- ✘ admission/code/diagnosis/460-519/493.20
- ✘ admission/code/diagnosis/460-519/493.21
- ✘ admission/code/diagnosis/460-519/493.22
- ✘ admission/code/diagnosis/460-519/493.81
- ✘ admission/code/diagnosis/460-519/493.82
- ✘ admission/code/diagnosis/460-519/493.90
- ✘ admission/code/diagnosis/460-519/493.91
- ✘ admission/code/diagnosis/460-519/493.92

Show compound events in detail?

Show all events in high contrast?

Show histories in normalized time?

Start! Select... Sort... Style... See... Snapshot? Save?

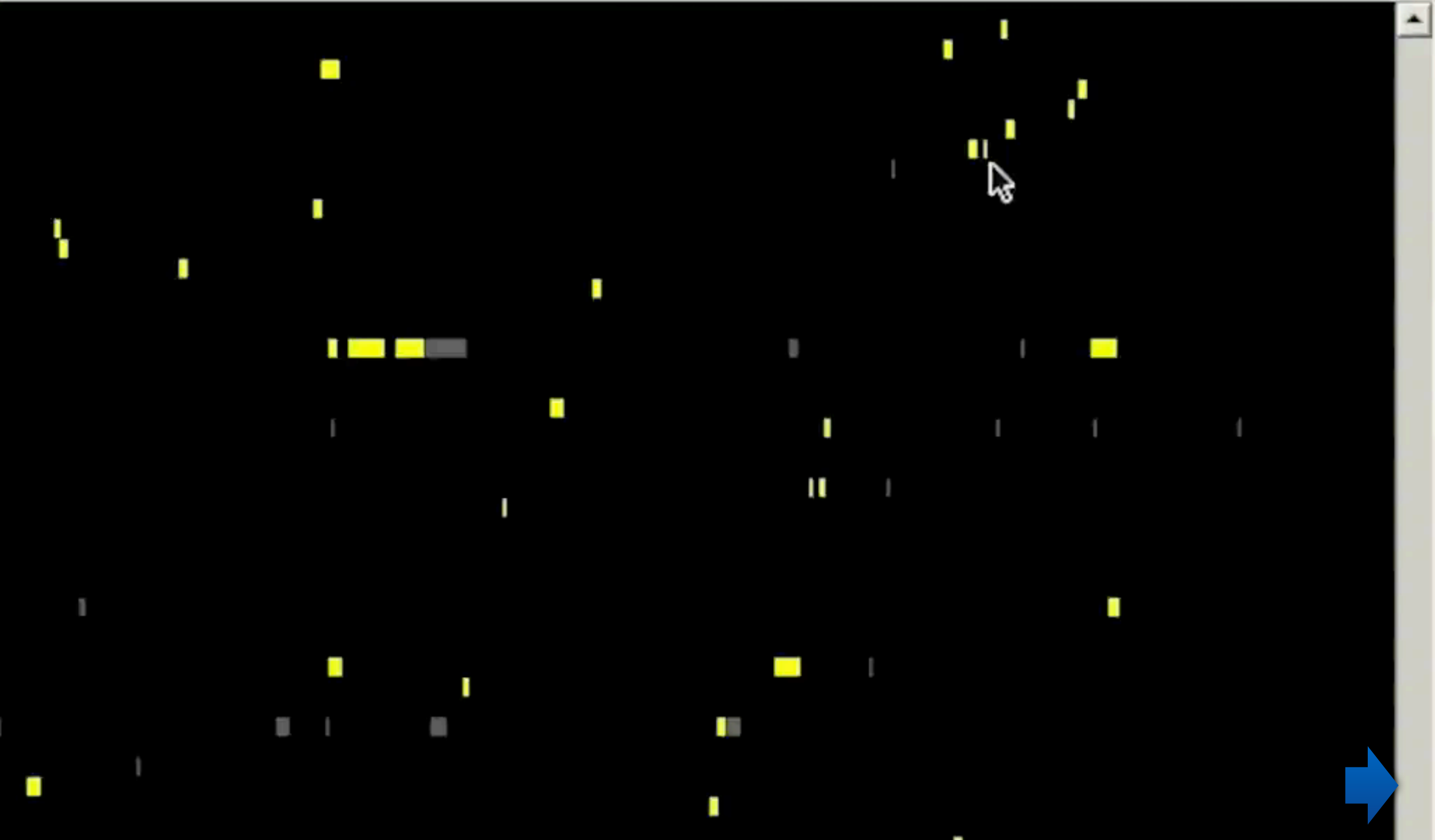
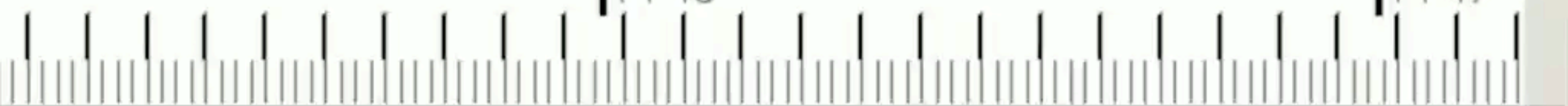


Temporal Behavior with Cloudburst

- Do asthma sufferers also suffer from bacterial pneumonia?

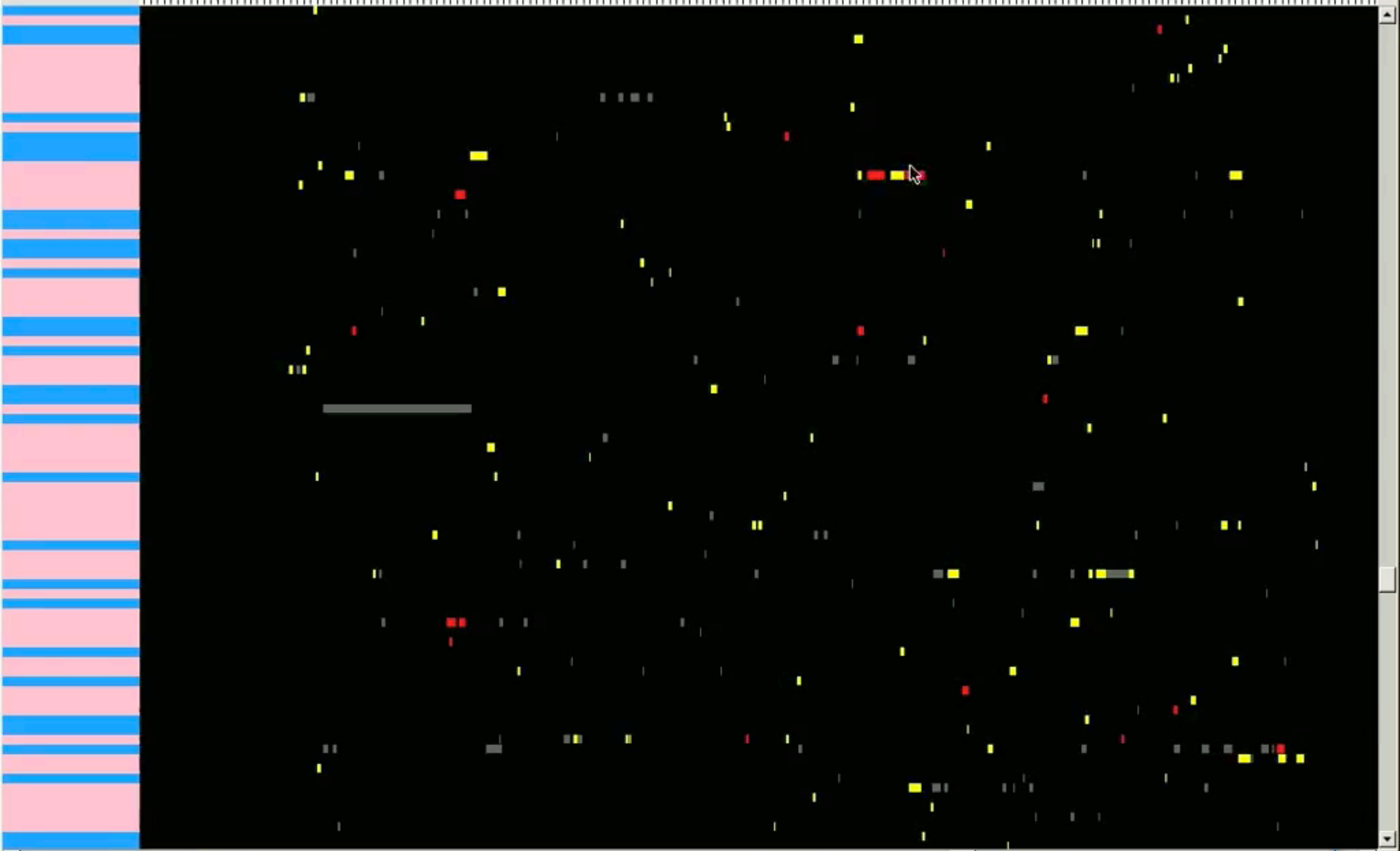
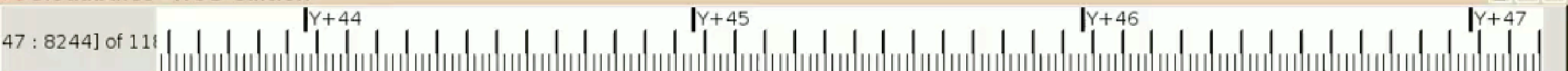
Y+46

Y+47



Temporal Behavior with Cloudburst

- Can chronic patients be differentiated from casual patients?



Start! Select... Sort... Style... See... Snapshot? Save?

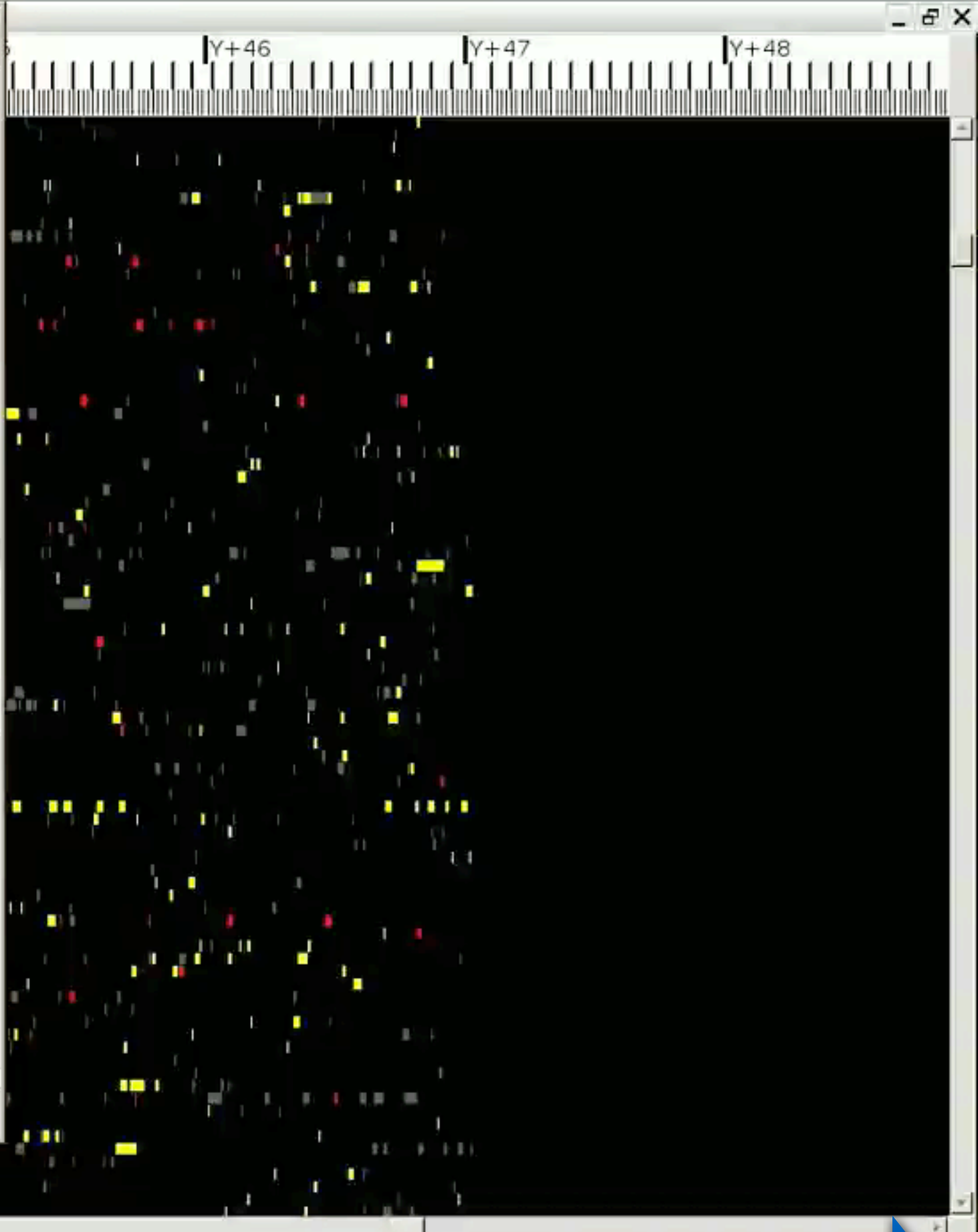


Start! Select... Sort... Style... See... Snapshot? Save?

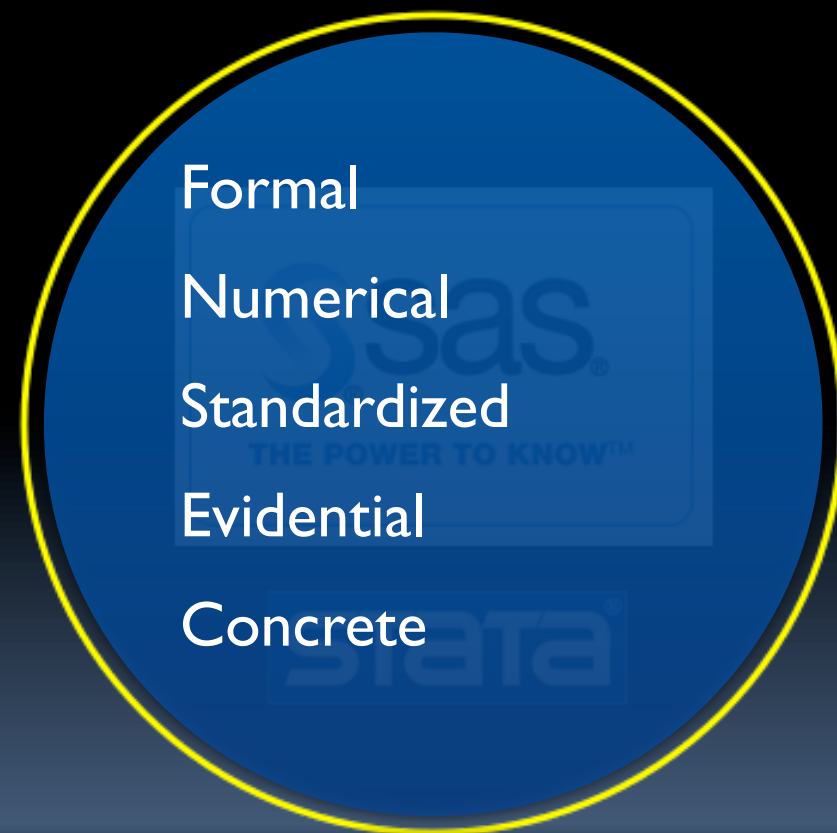
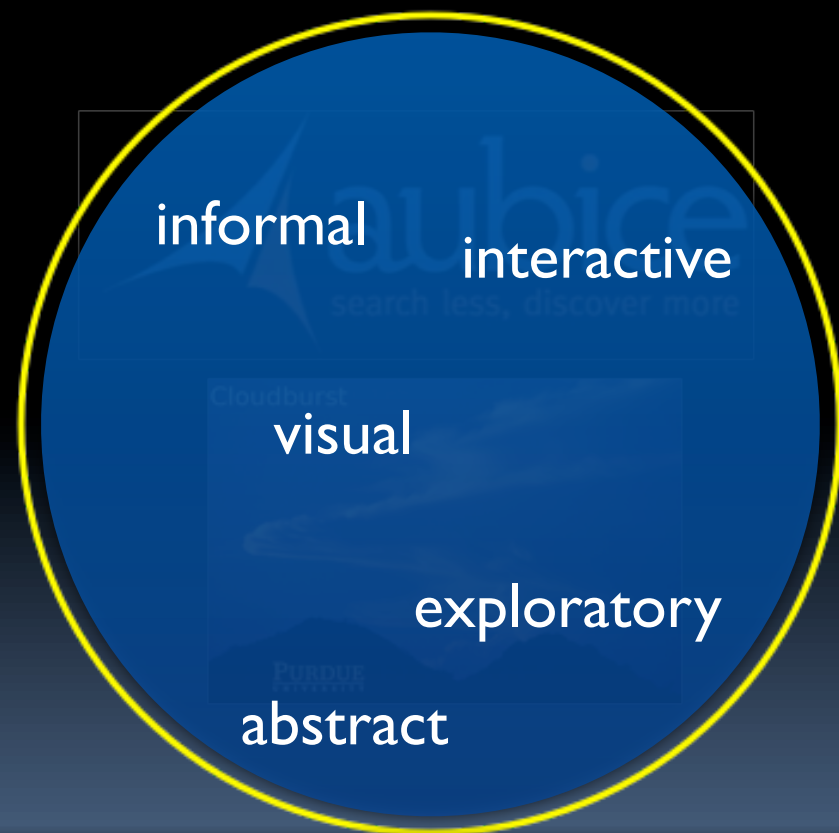
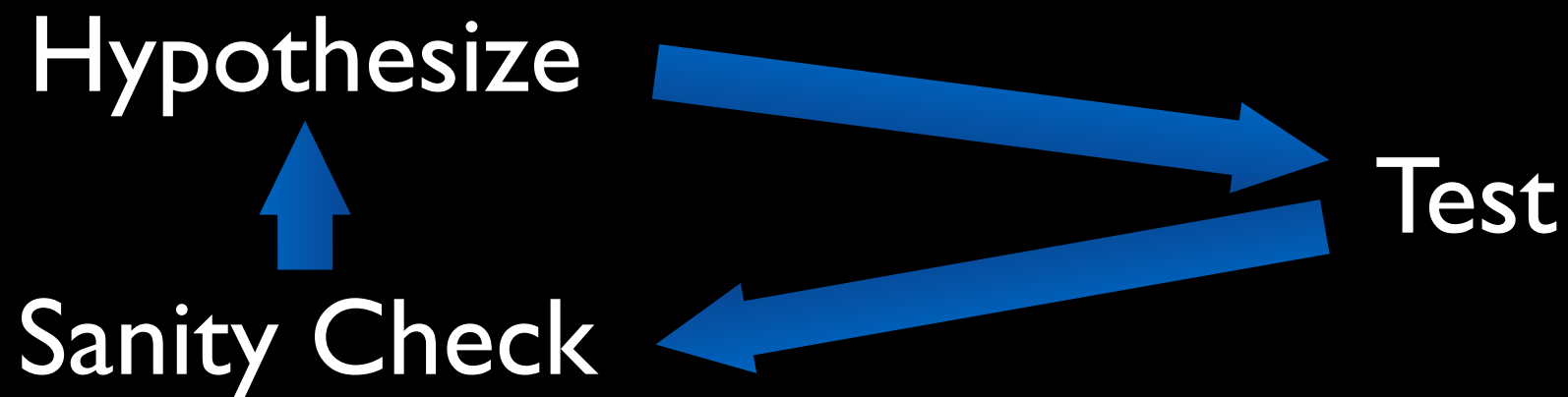
Entity in detail...

patientid: schedule_designs
 admissionid: dent_arranging
 admission_number: 2
 length_of_stay: 49
 time_to_next_admission: 14
 admission_type: URGENT
 discharge_disposition: XFR/DSH HOME CARE REL ADM
 age: 0
 payer_class: MEDICAID
 marital_status: SINGLE
 primary_care_physician: 00000_00000
 admitting_physician: history_misting
 attending_physician: history_misting

admission/age/00 | admission/code/diagnosis/240-279/276.51
 admission/code/diagnosis/320-359/359.9
 admission/code/diagnosis/360-389/382.9
 admission/code/diagnosis/390-459/427.89
 admission/code/diagnosis/460-519/493.90
 admission/code/diagnosis/520-579/530.81
 admission/code/diagnosis/780-799/781.3
 admission/code/diagnosis/780-799/783.3
 admission/code/diagnosis/780-799/783.40
 admission/code/diagnosis/780-799/783.41
 admission/code/diagnosis/780-799/786.03
 admission/code/diagnosis/780-799/787.91
 admission/code/primary/diagnosis/520-579/530.81



Complementary Approaches



HUB Infrastructure

For More Information

- mzentner “at” purdue “dot” edu
- ndenny “at” purdue “dot” edu