Showing High-dimensional Correlation with *Color*

Ivan Zhao

a general visualization technique,
no problem domain

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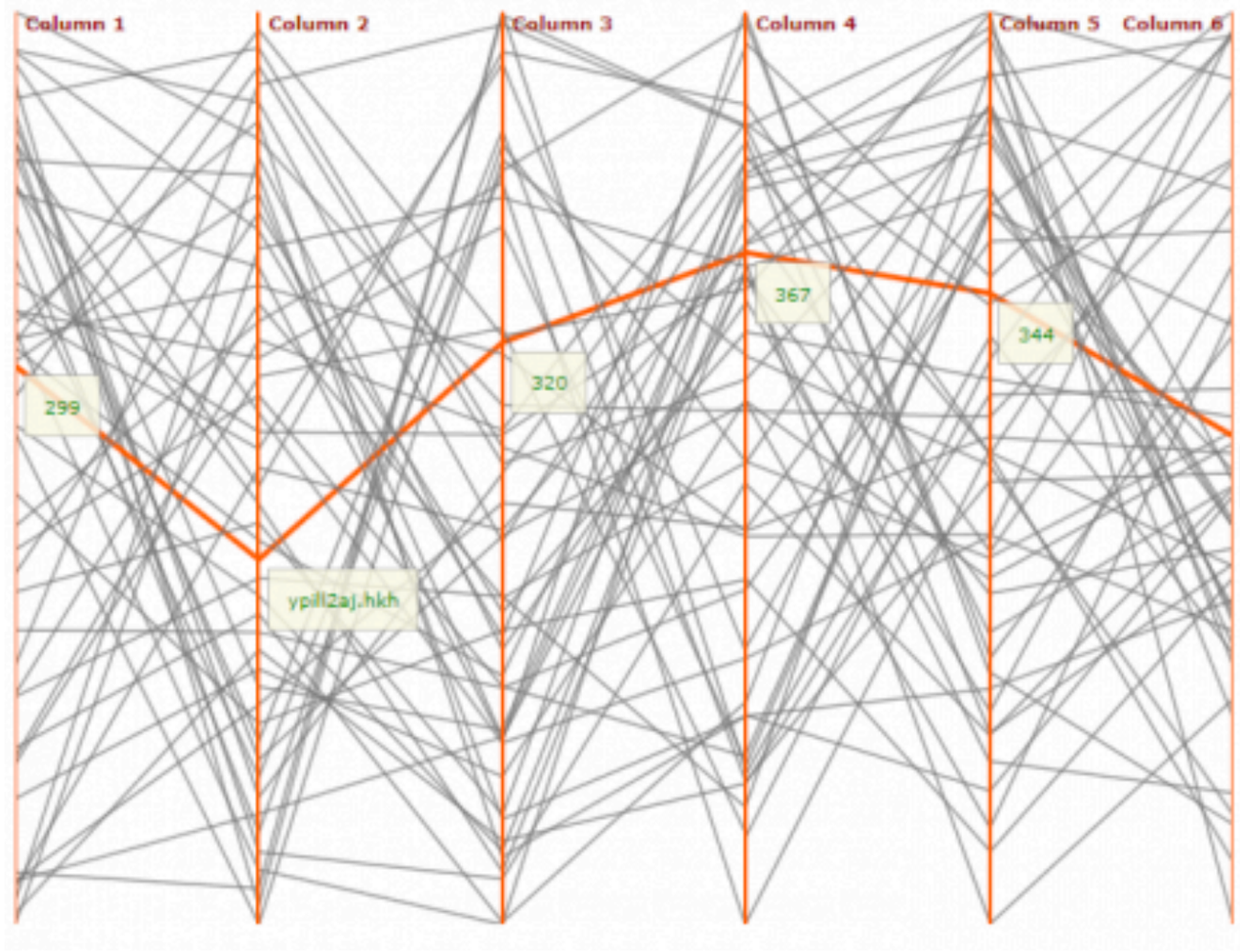
no problem domain

a. high-dimensional data (tabular)

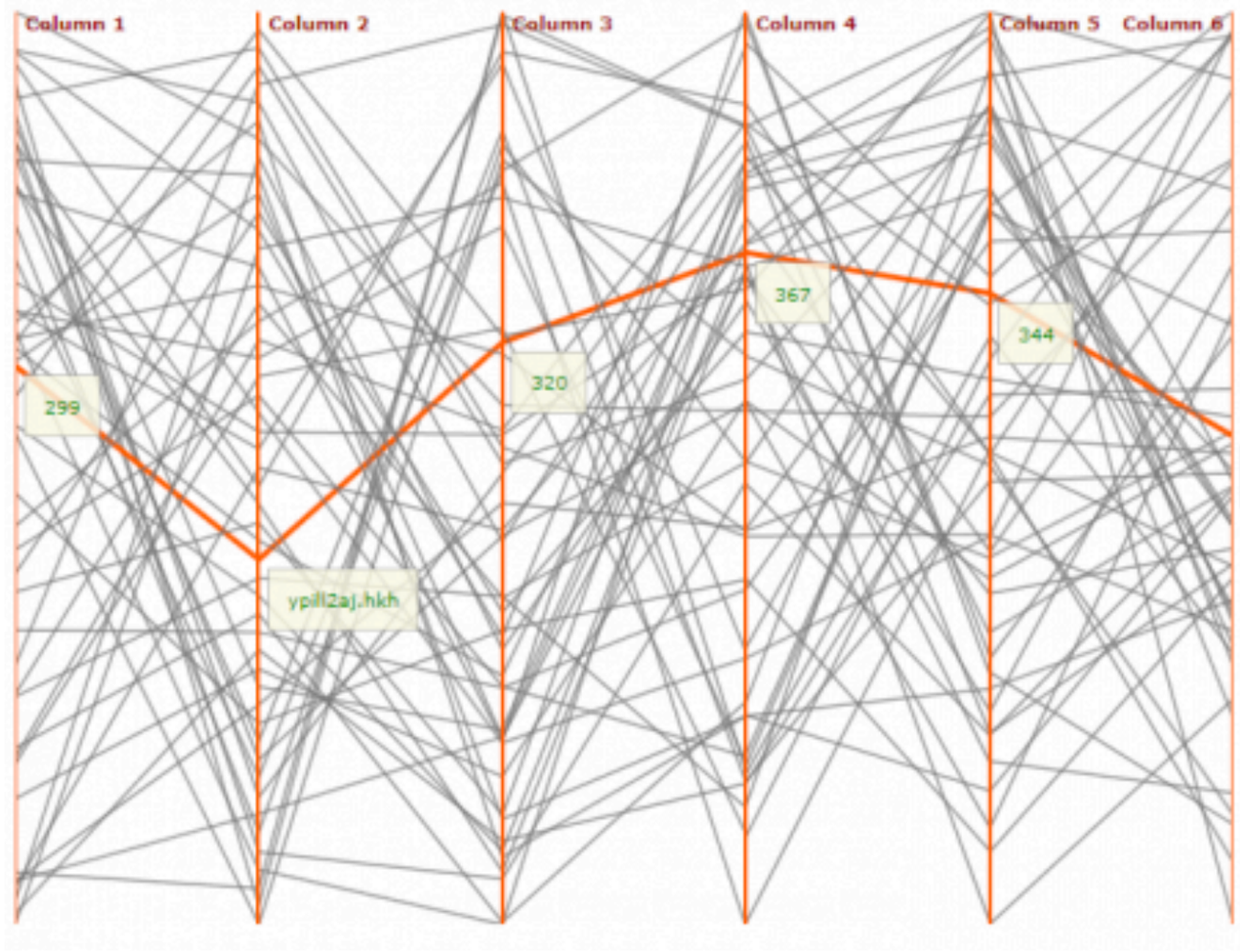
b. correlations (between values)

previous work #1:
Parallel Coordinates



- focus on individual documents (each as a edge)
  high level of detail

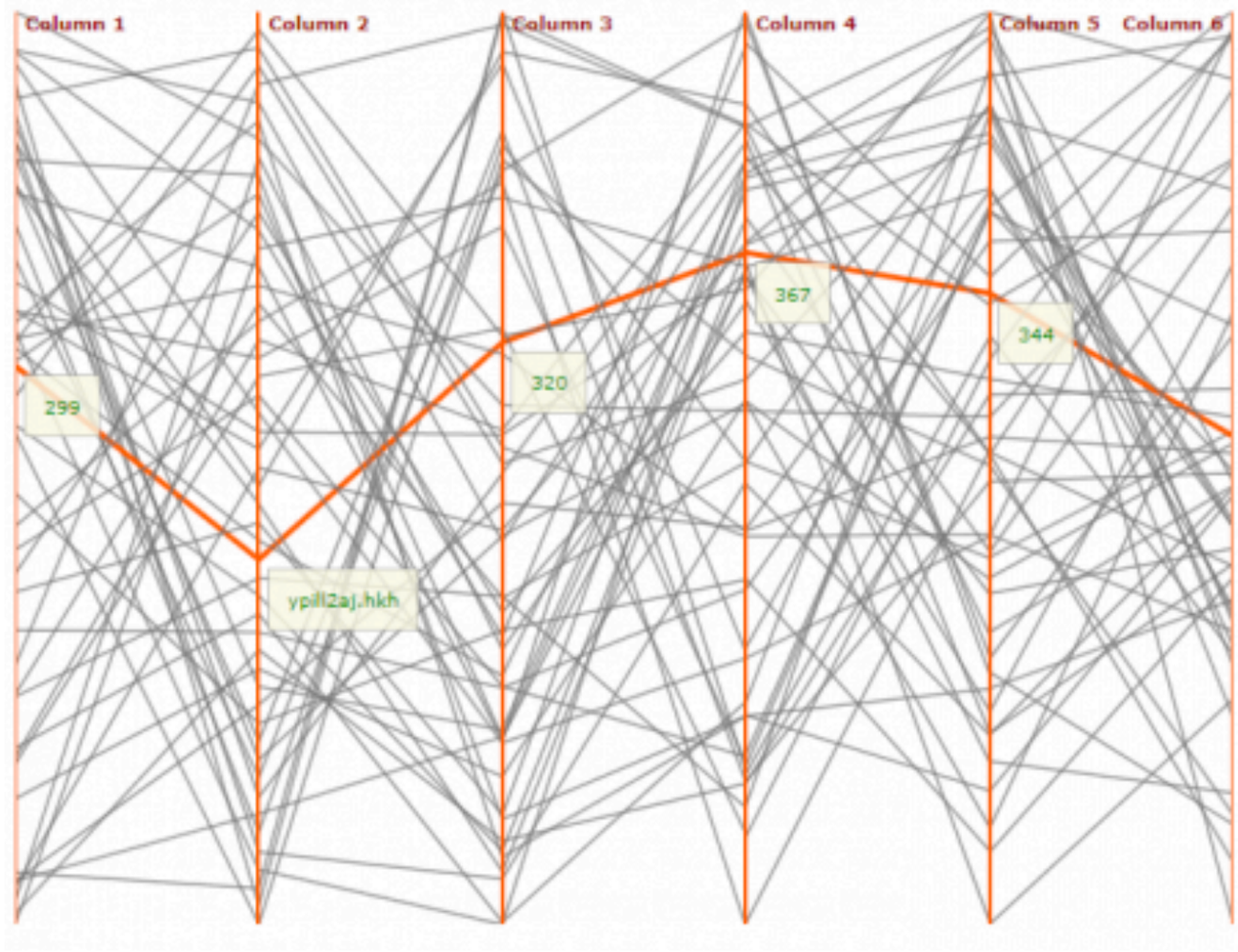
previous work #1:
Parallel Coordinates



- focus on individual documents (each as a edge)
  high level of detail

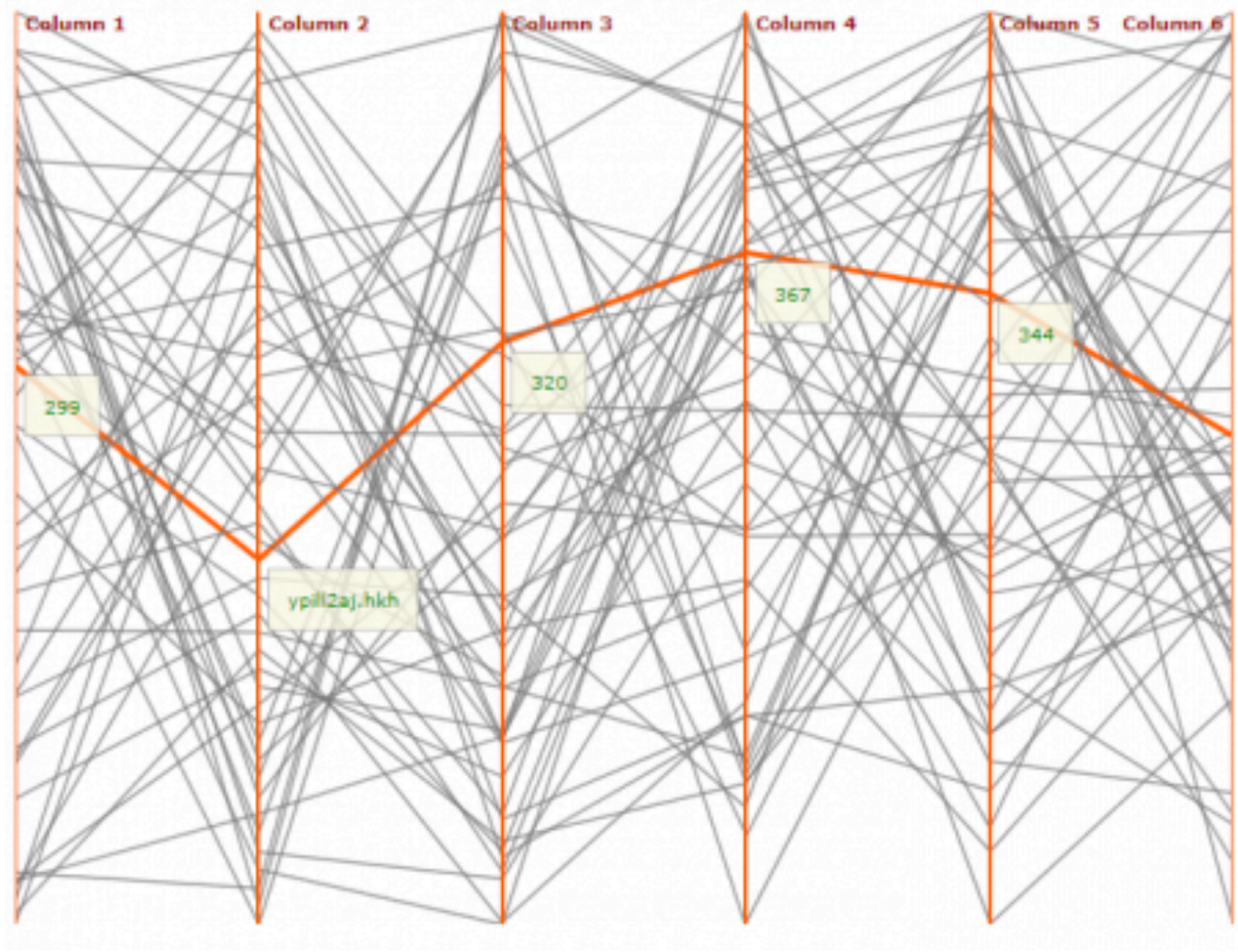
- annoying edges, given our limited attention

previous work #1:
Parallel Coordinates



in essence, we are *connecting* neighbouring dimensions

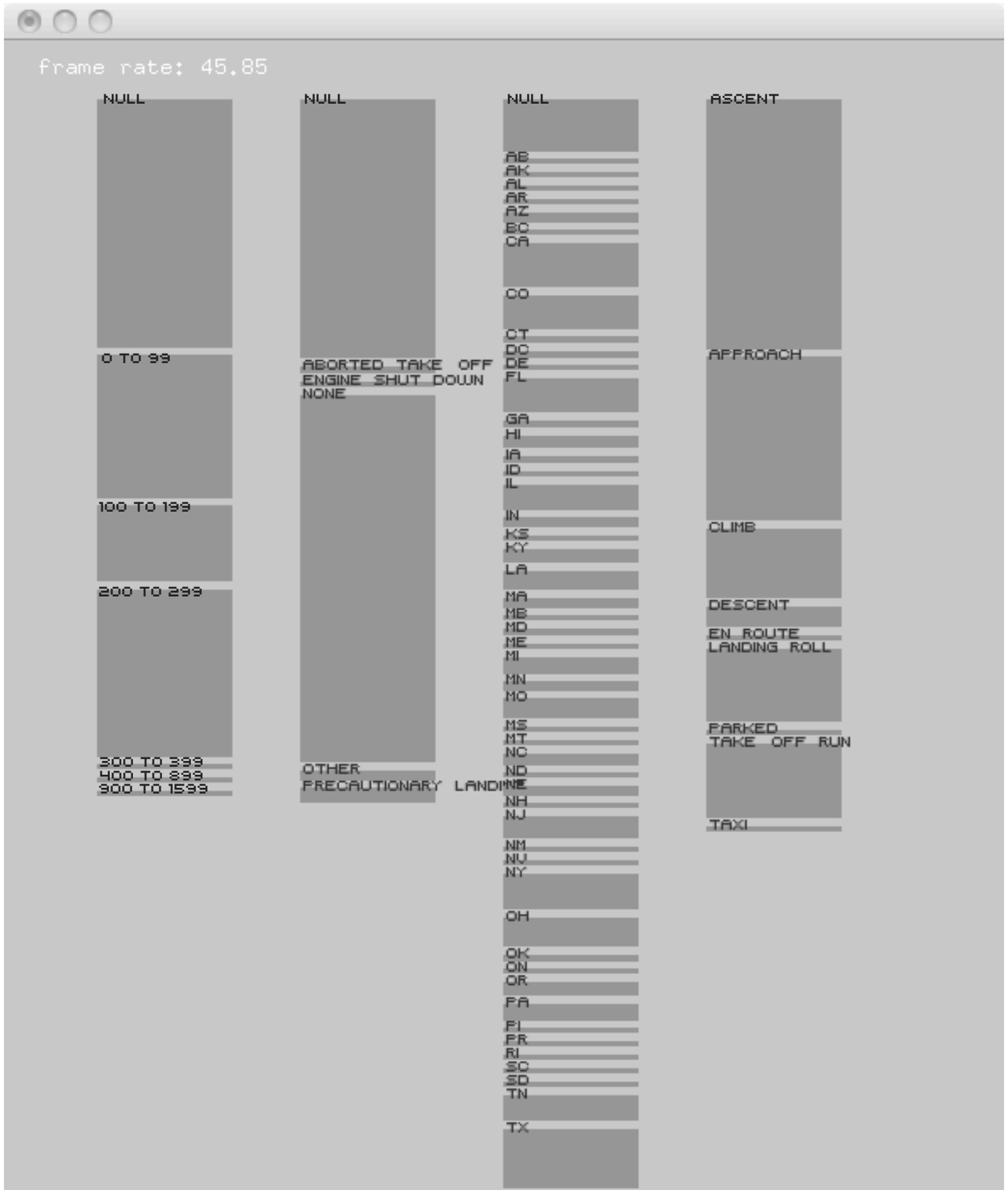
previous work #1:
Parallel Coordinates



in essence, we are *connecting* neighbouring dimensions

we have many other options (besides edges/lines)
e.g. texture, animation, color, area, shapes...

my proposed design:



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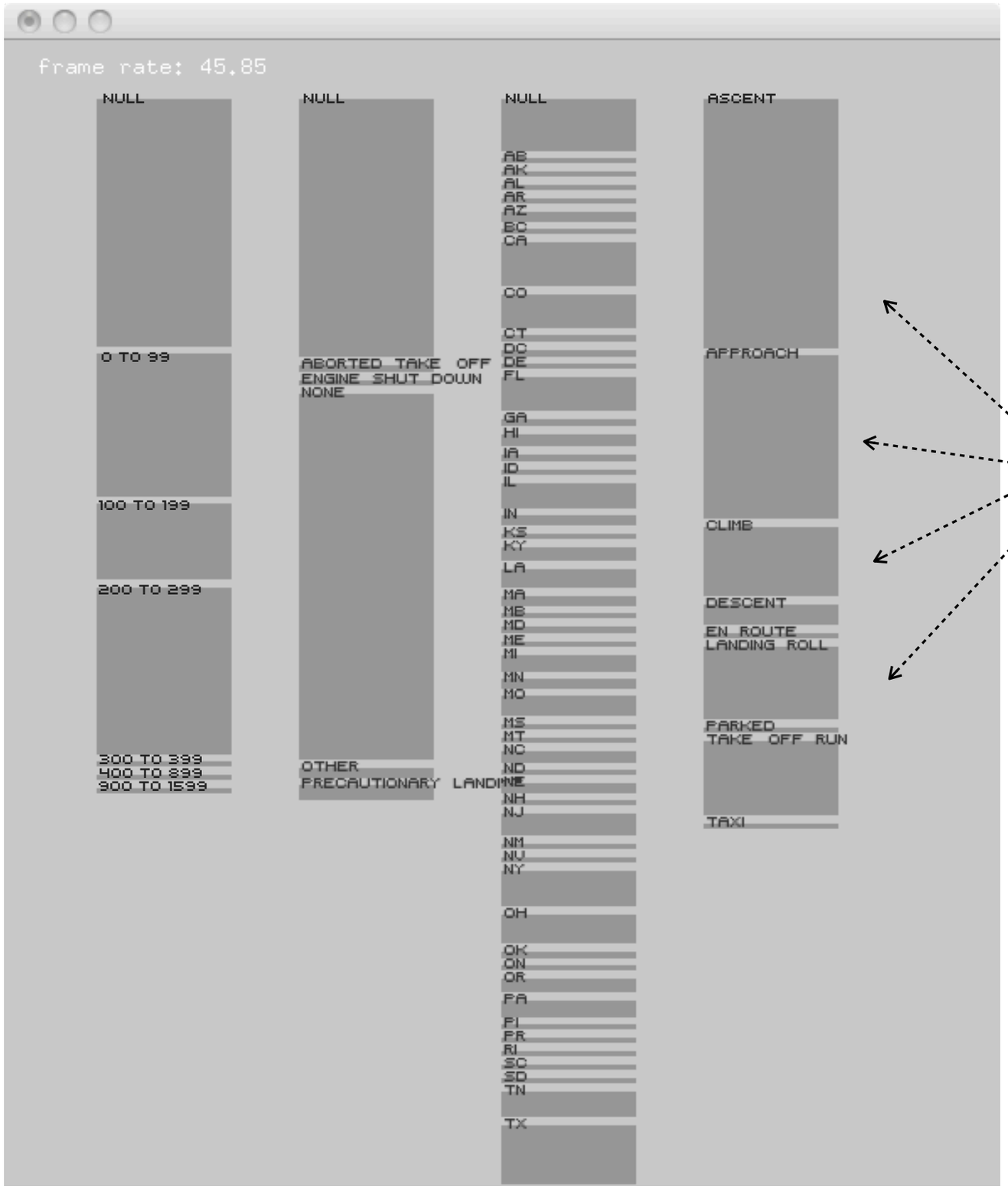
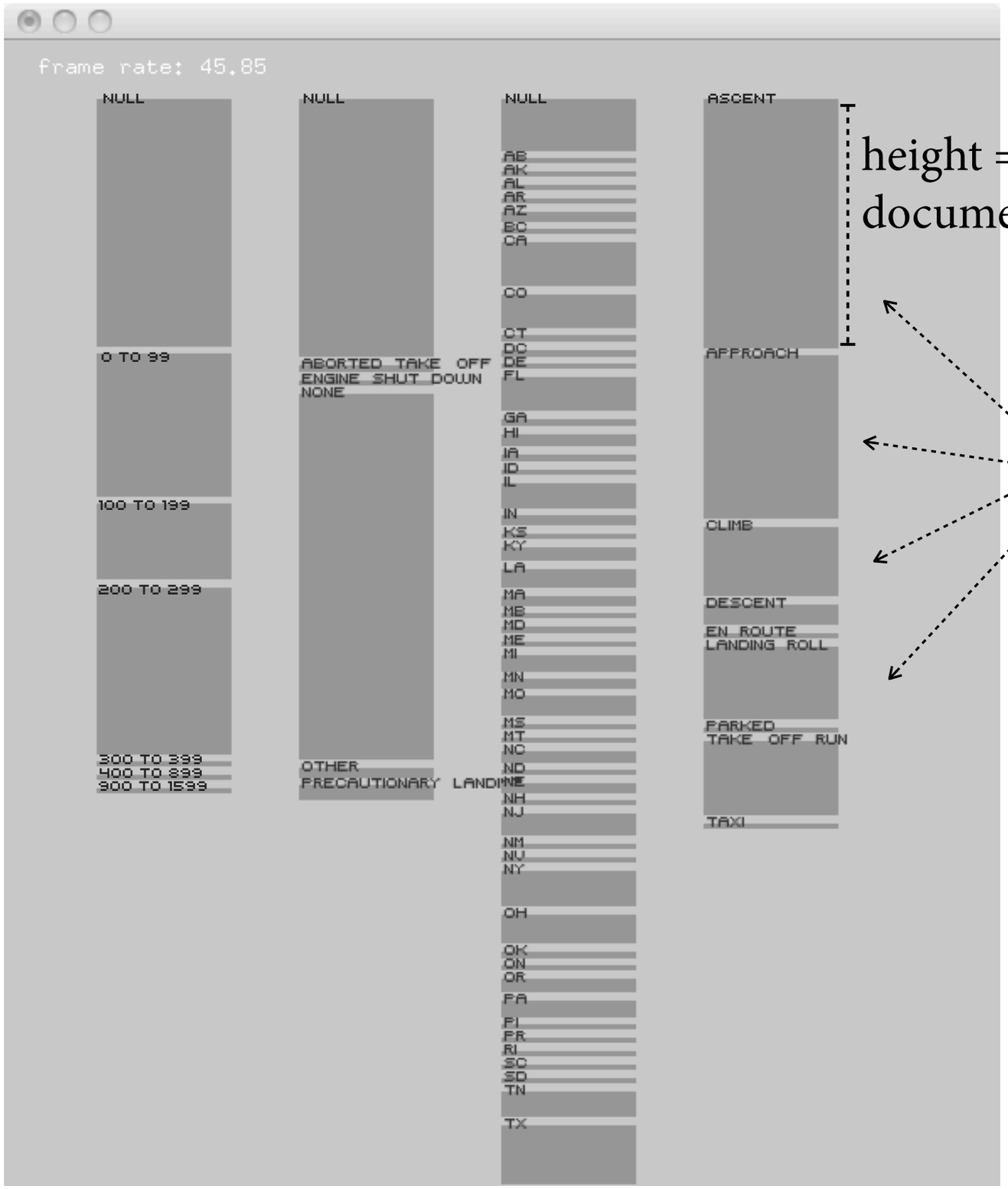


each block is a value
(e.g. *phase of flight*)

my proposed design:



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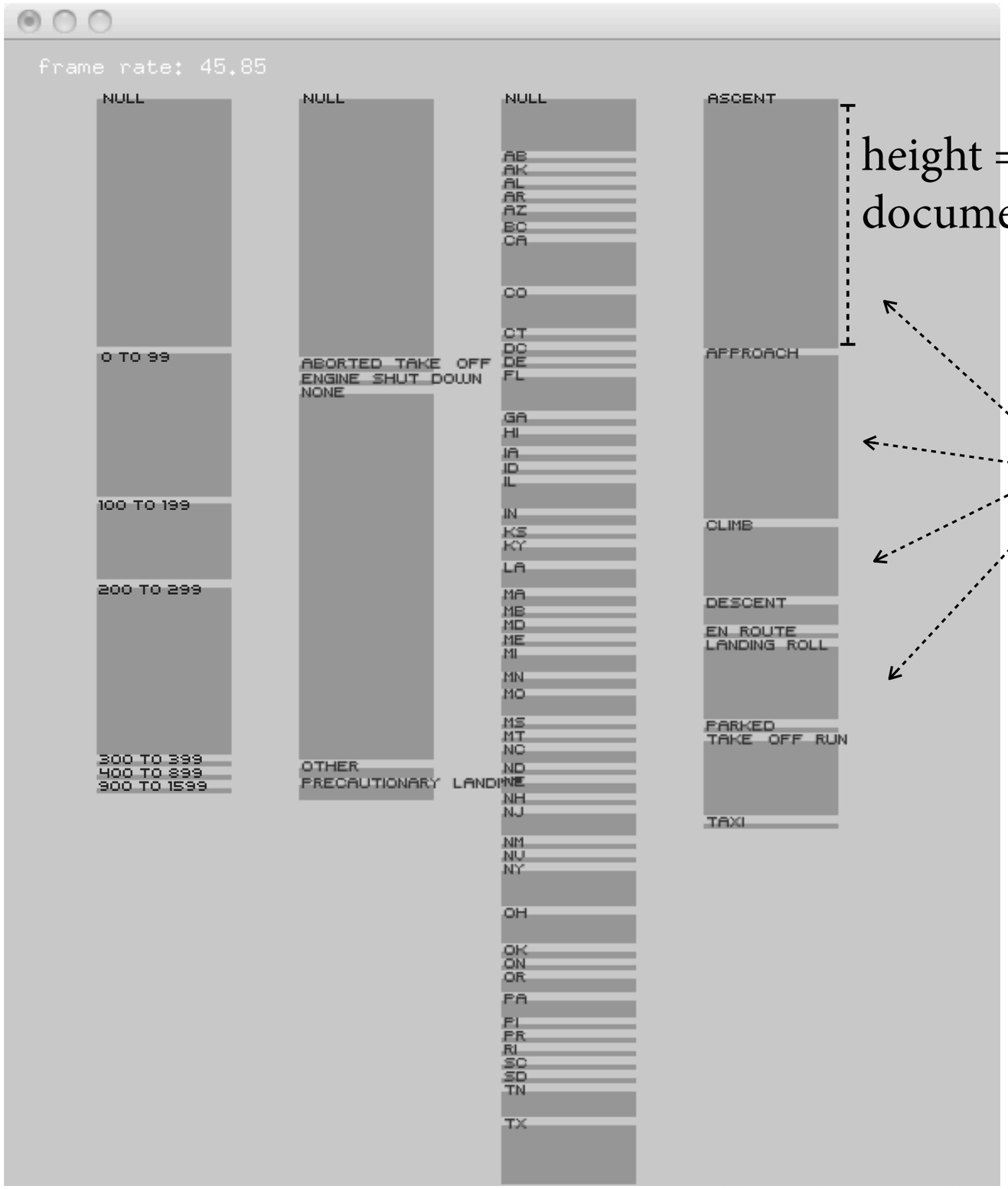

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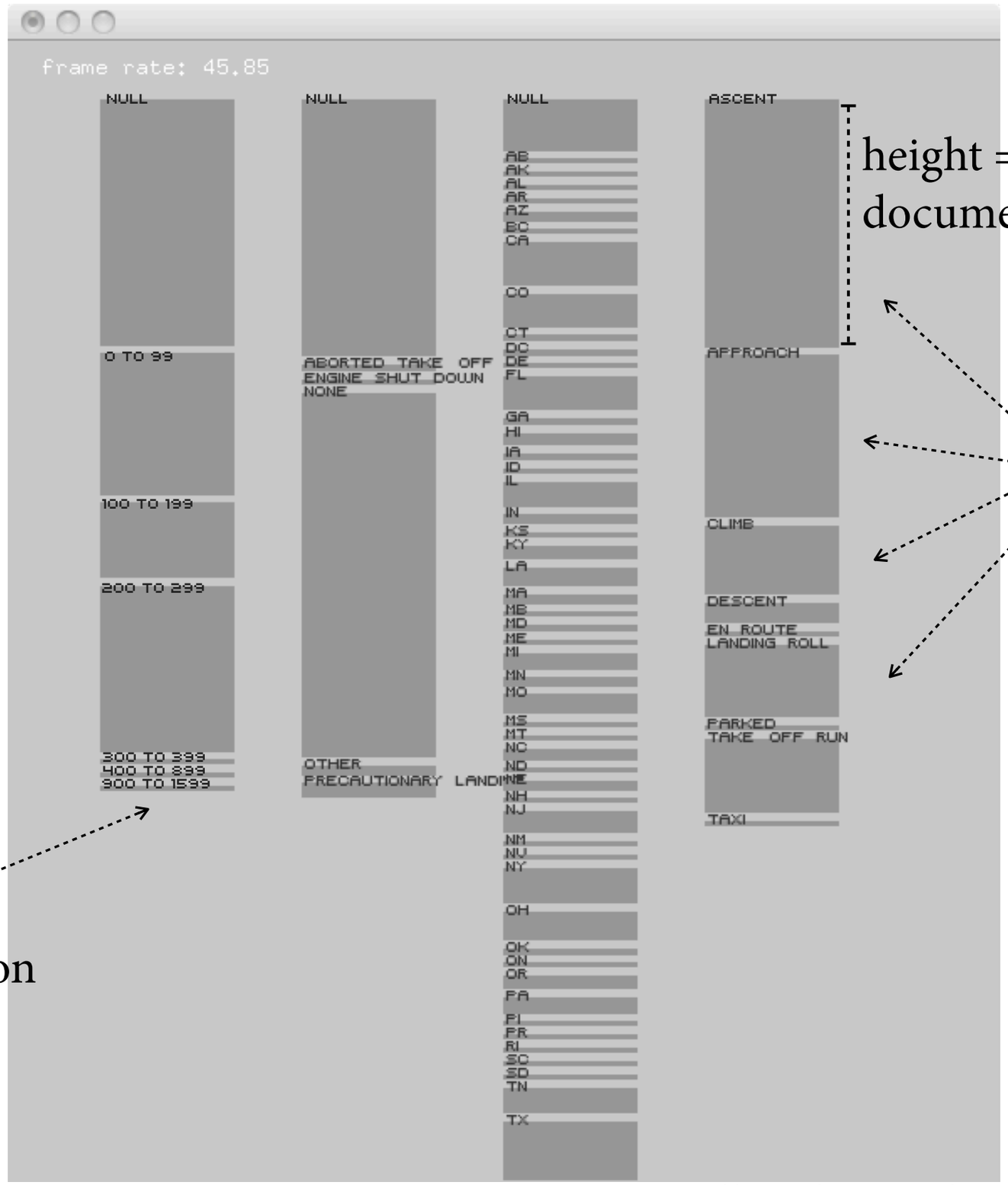


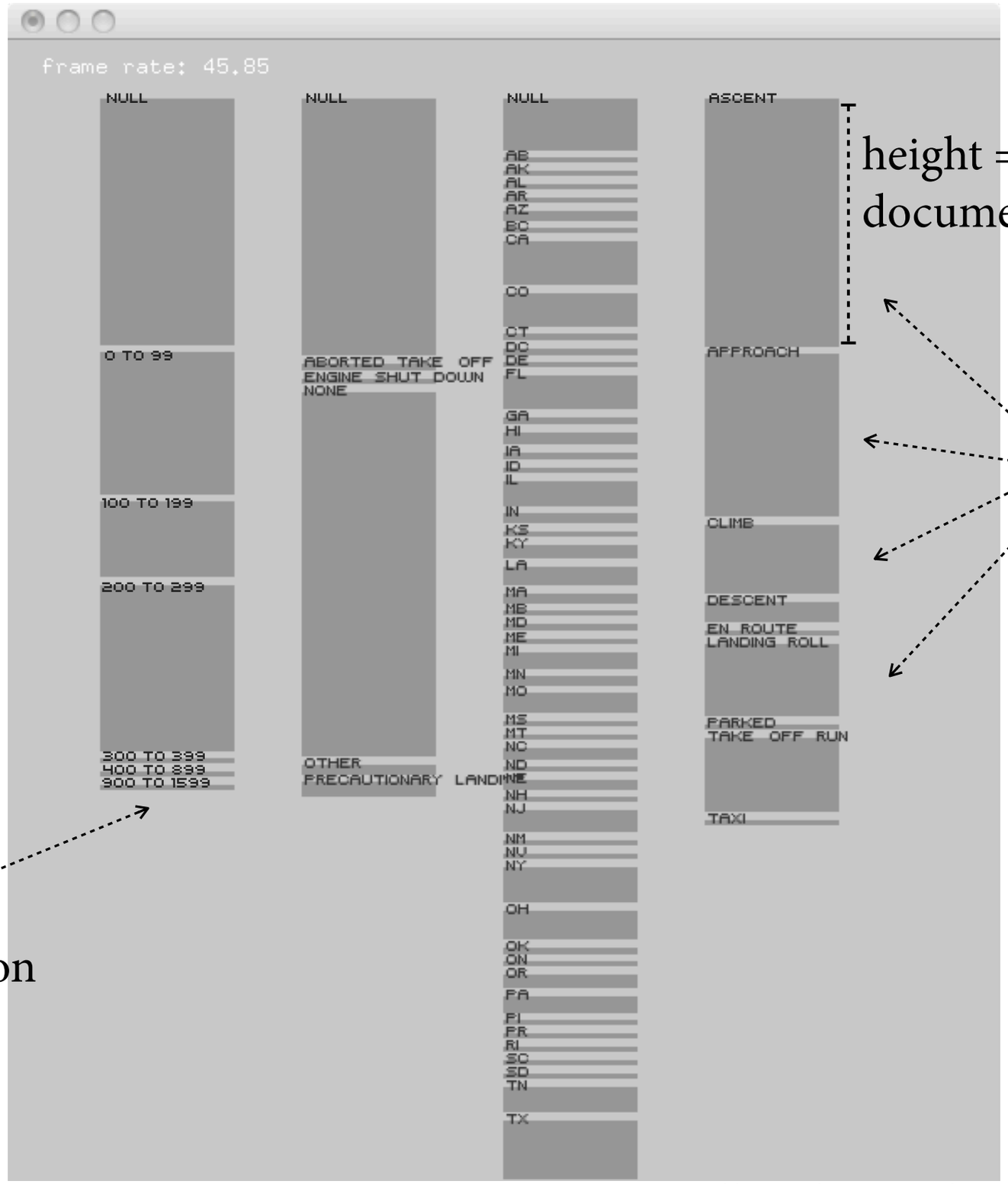
height = number of documents

each block is a value (e.g. *phase of flight*)

adjustable bins for numerical dimension

taller, due to the gaps

my proposed design:



height = number of documents

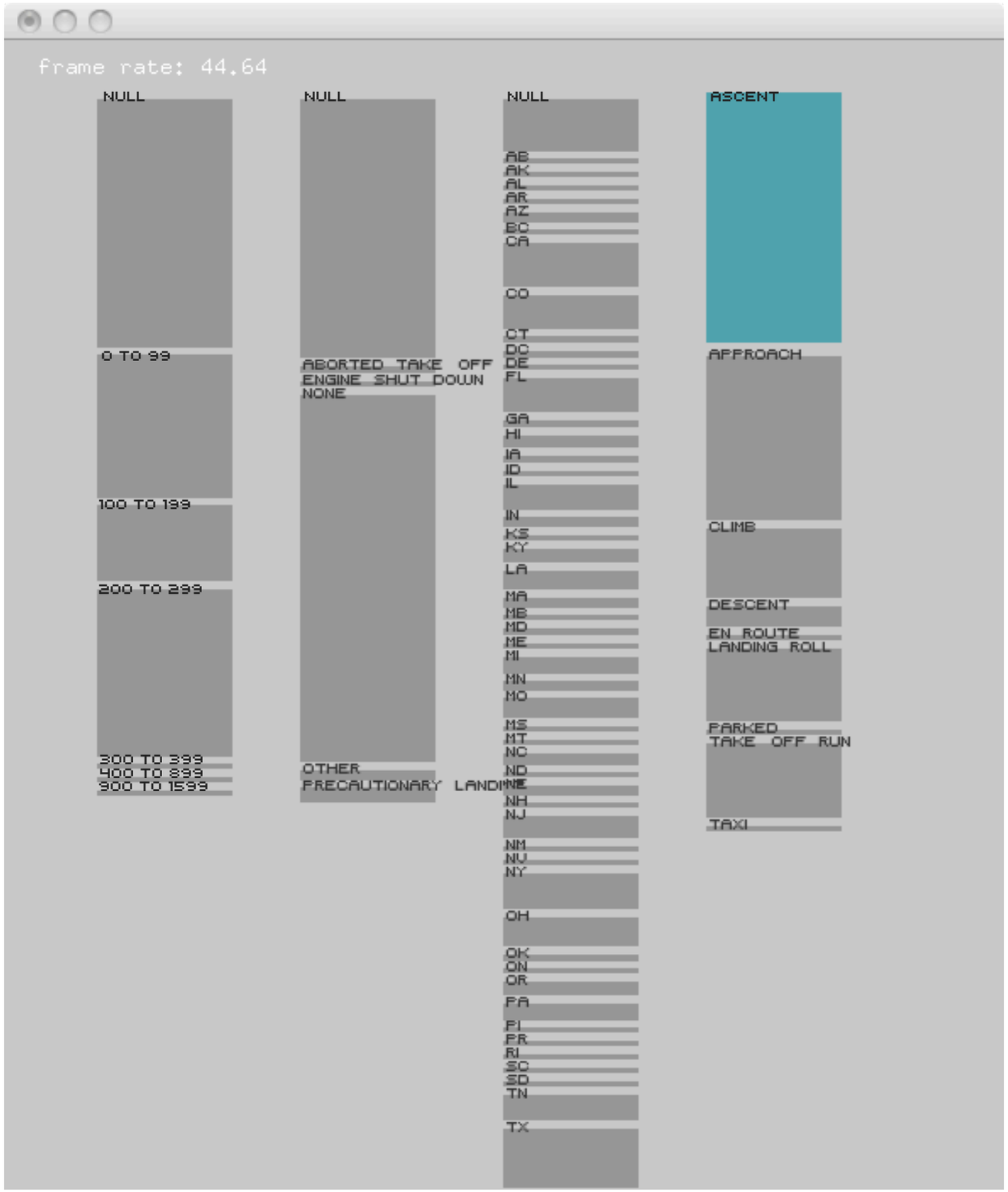
each block is a value (e.g. *phase of flight*)

adjustable bins for numerical dimension

taller, due to the gaps

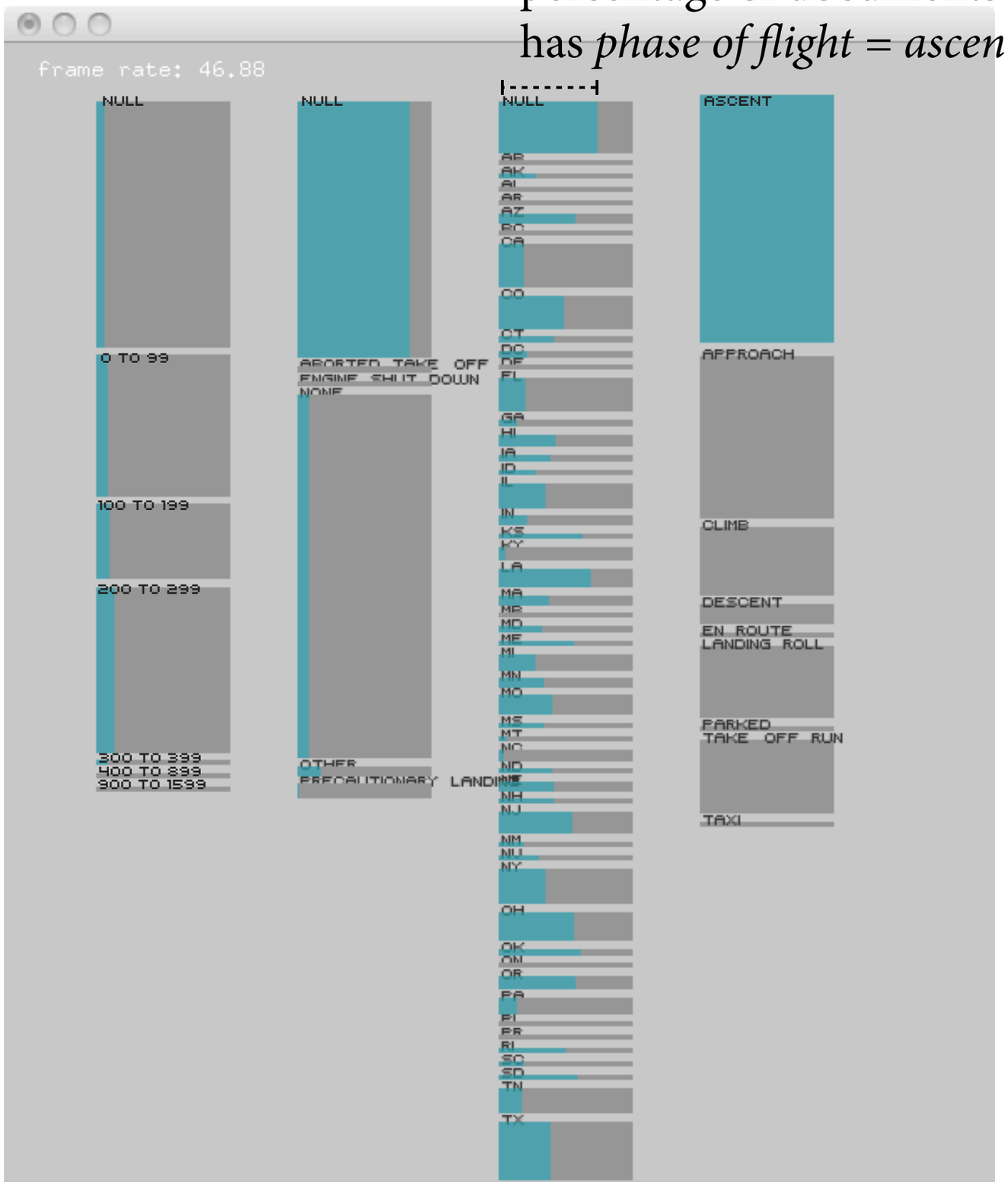
how do we show the connections b/w dimensions?

my proposed design:

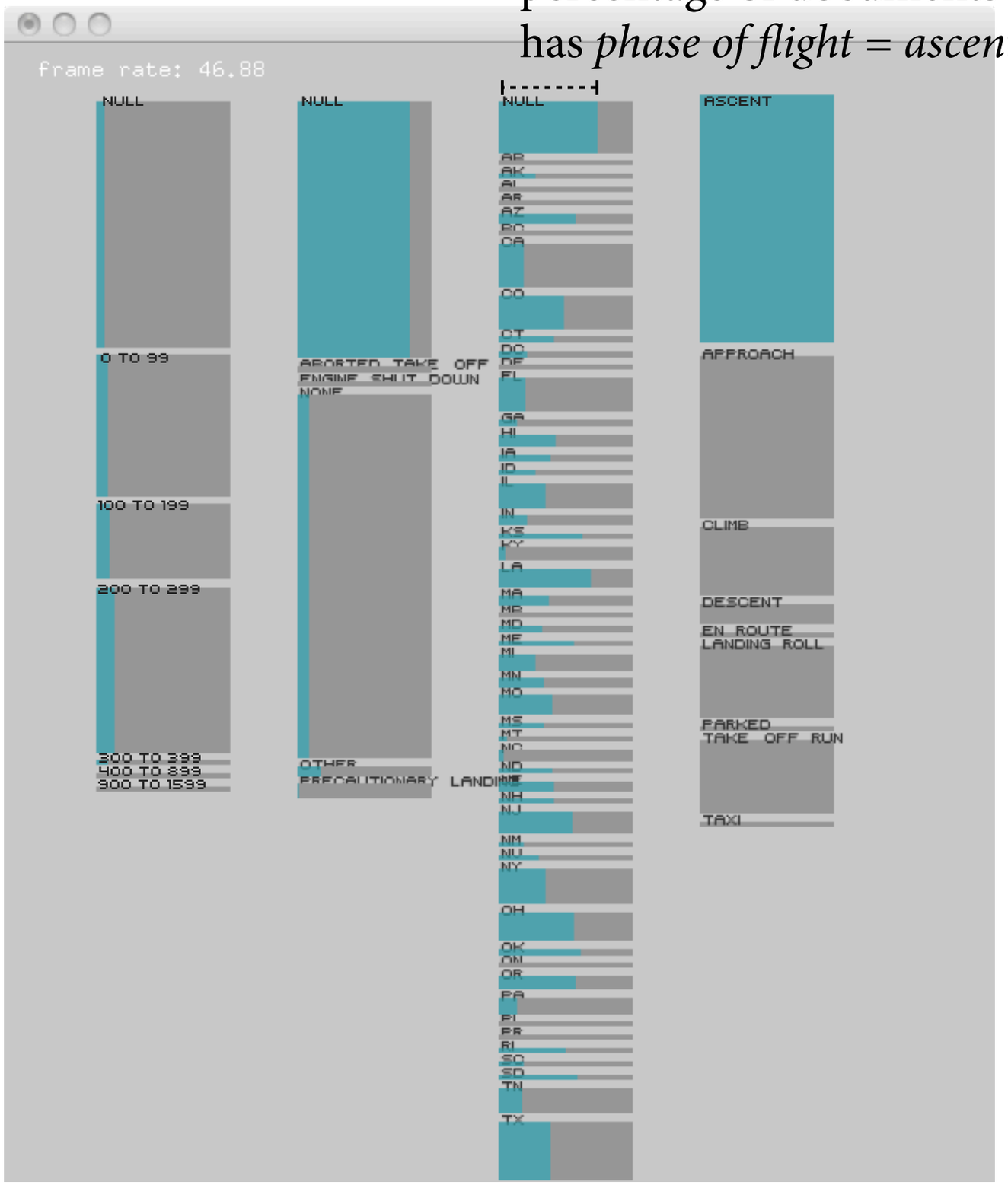


my proposed design:

percentage of documents
has *phase of flight* = *ascent*



my proposed design:

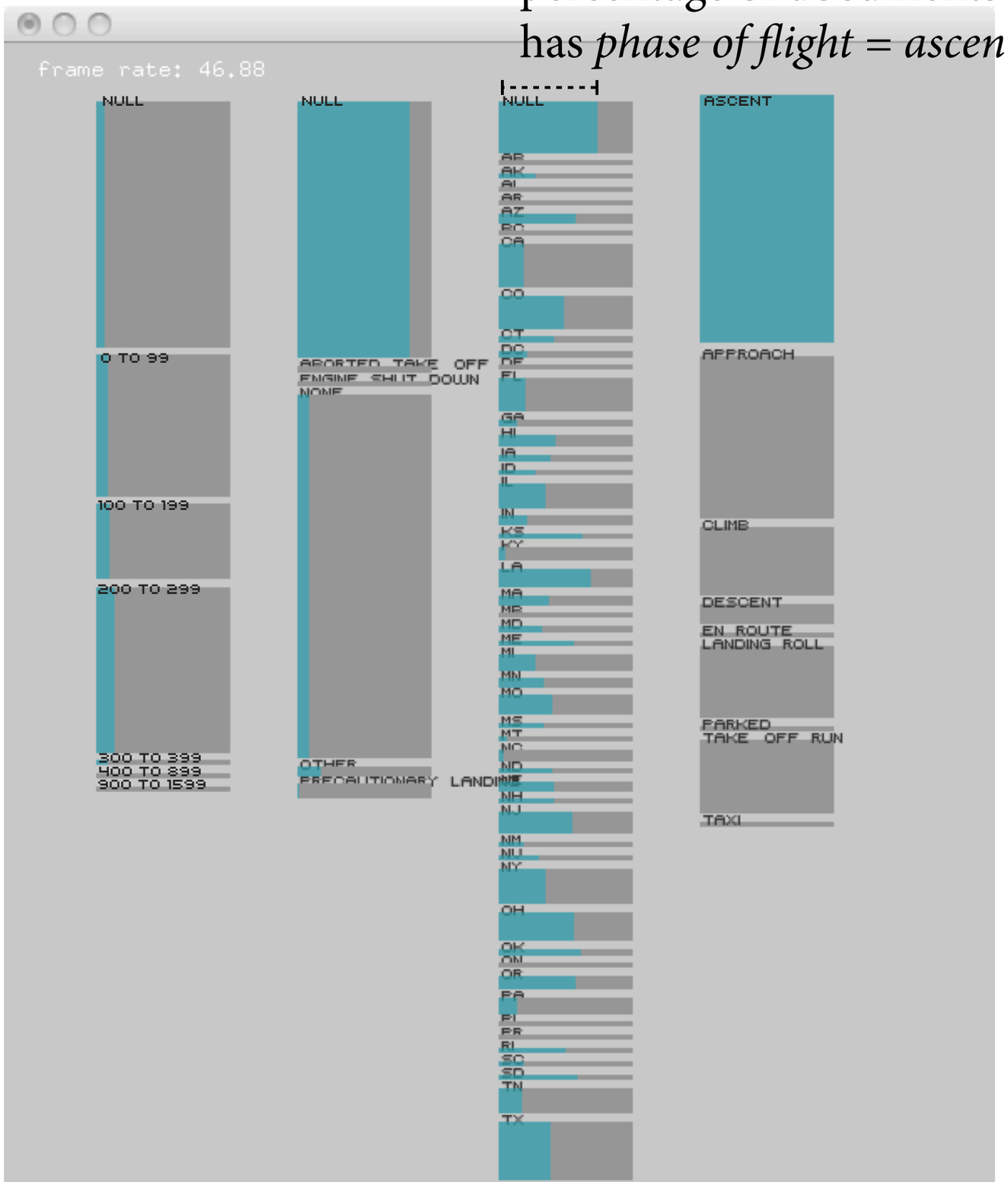


percentage of documents
has *phase of flight = ascent*

many-to-one relationship
(v.s neighbouring pairs in
Parallel Coordinates)

my proposed design:

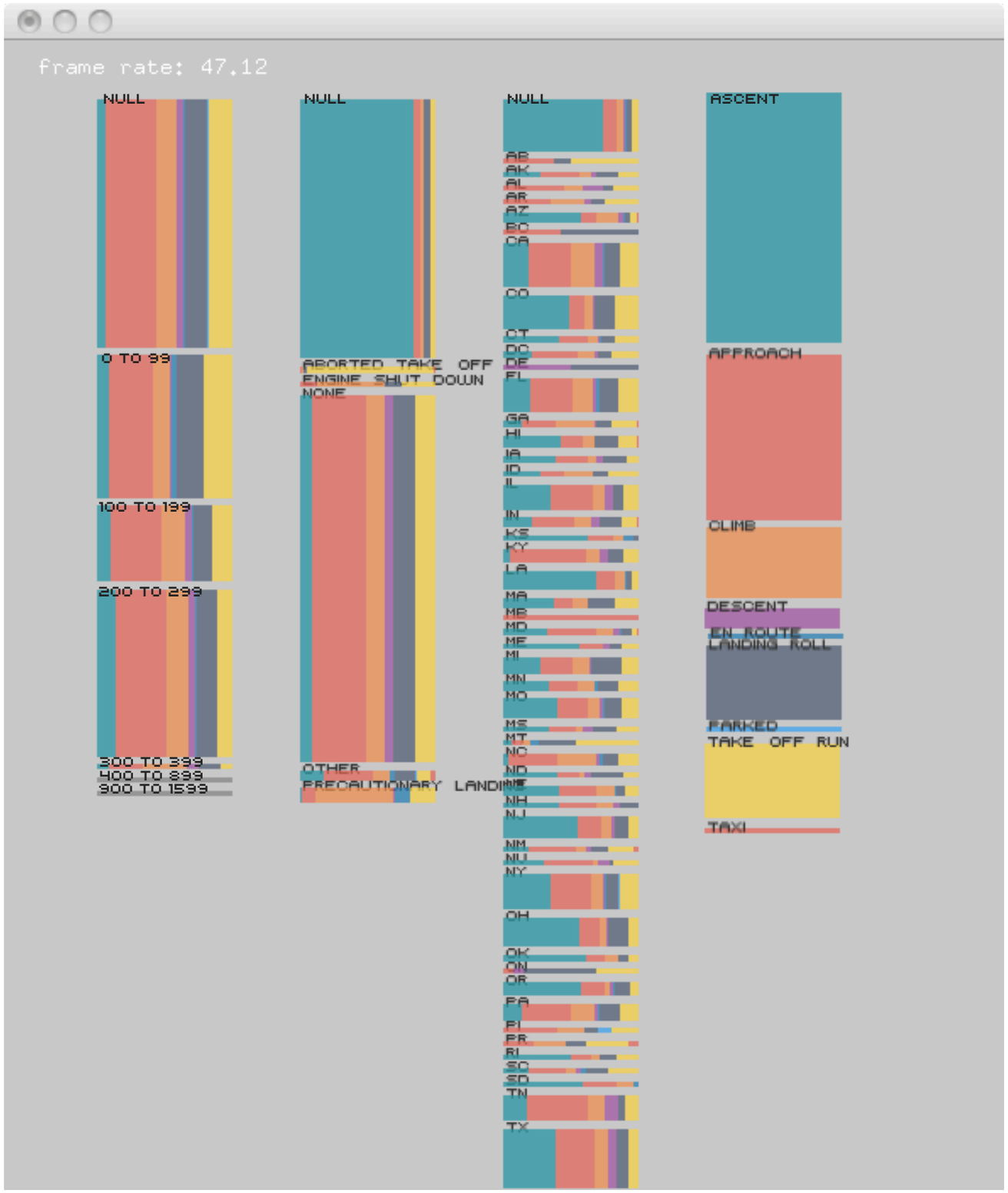
percentage of documents
has *phase of flight = ascent*



many-to-one relationship
(v.s neighbouring pairs in
Parallel Coordinates)

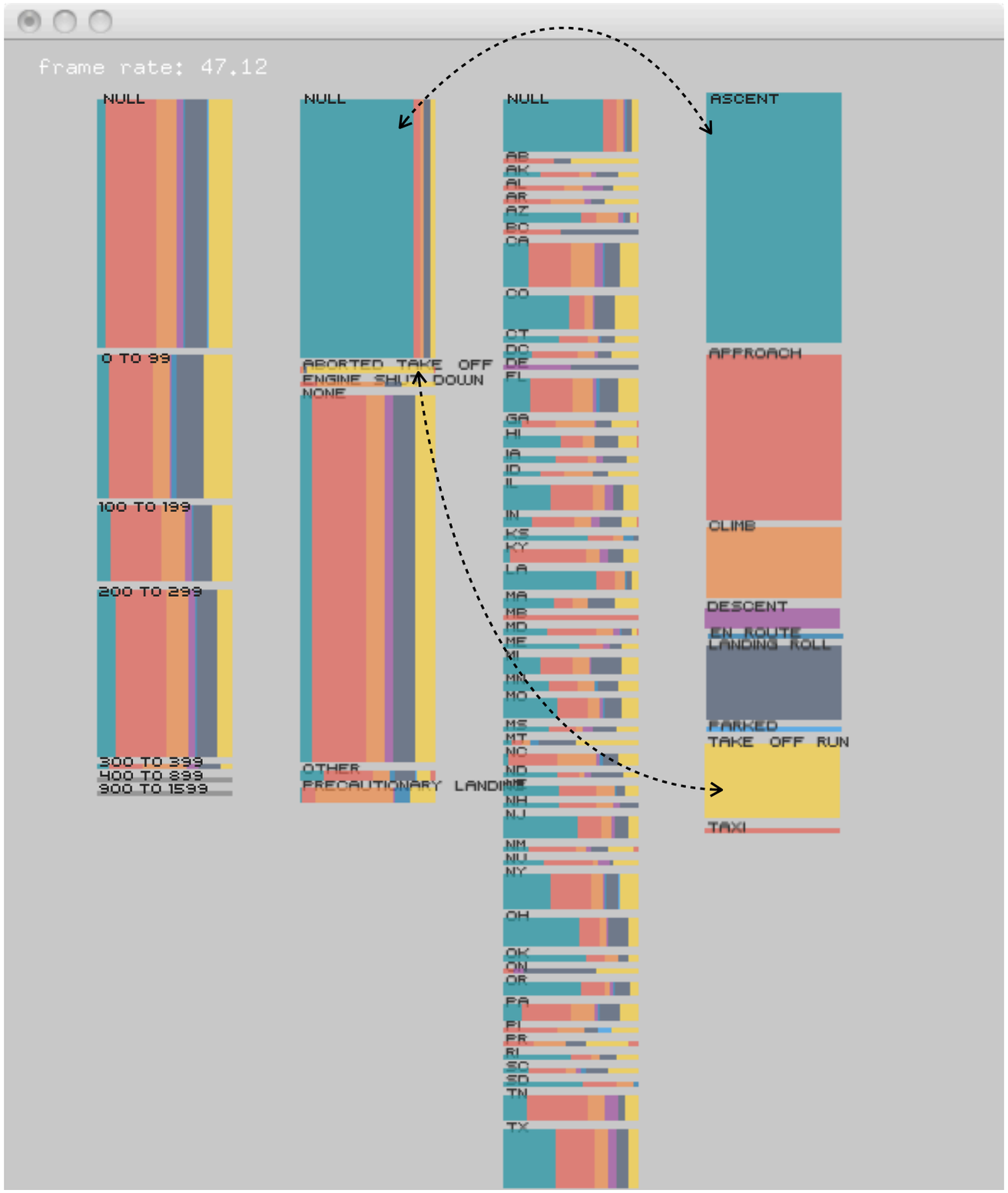
outliers still visible

my proposed design:



stacked bar charts turned around, and normalized

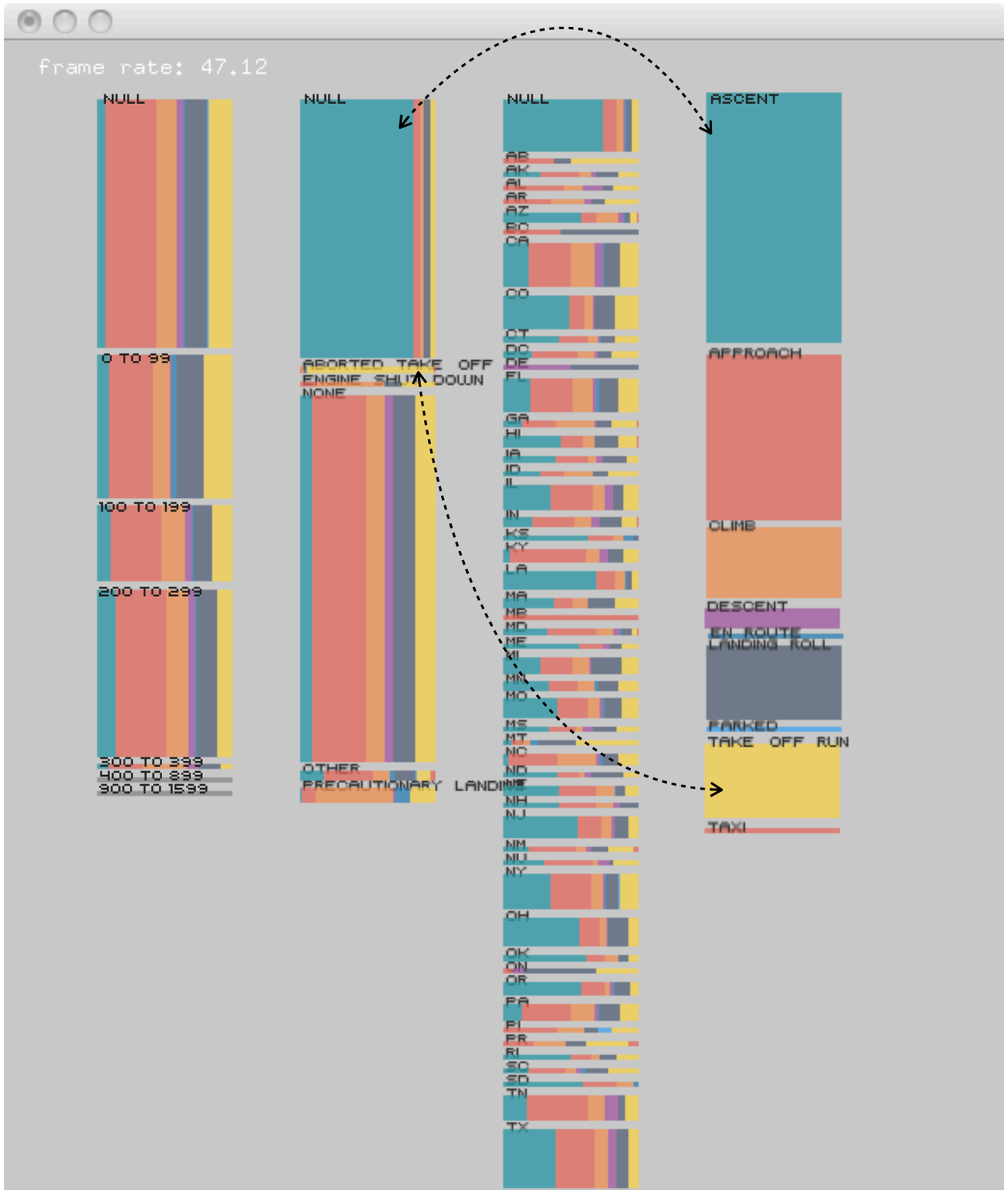
my proposed design:



stacked bar charts turned around, and normalized

correlations shown through “color domination”

my proposed design:

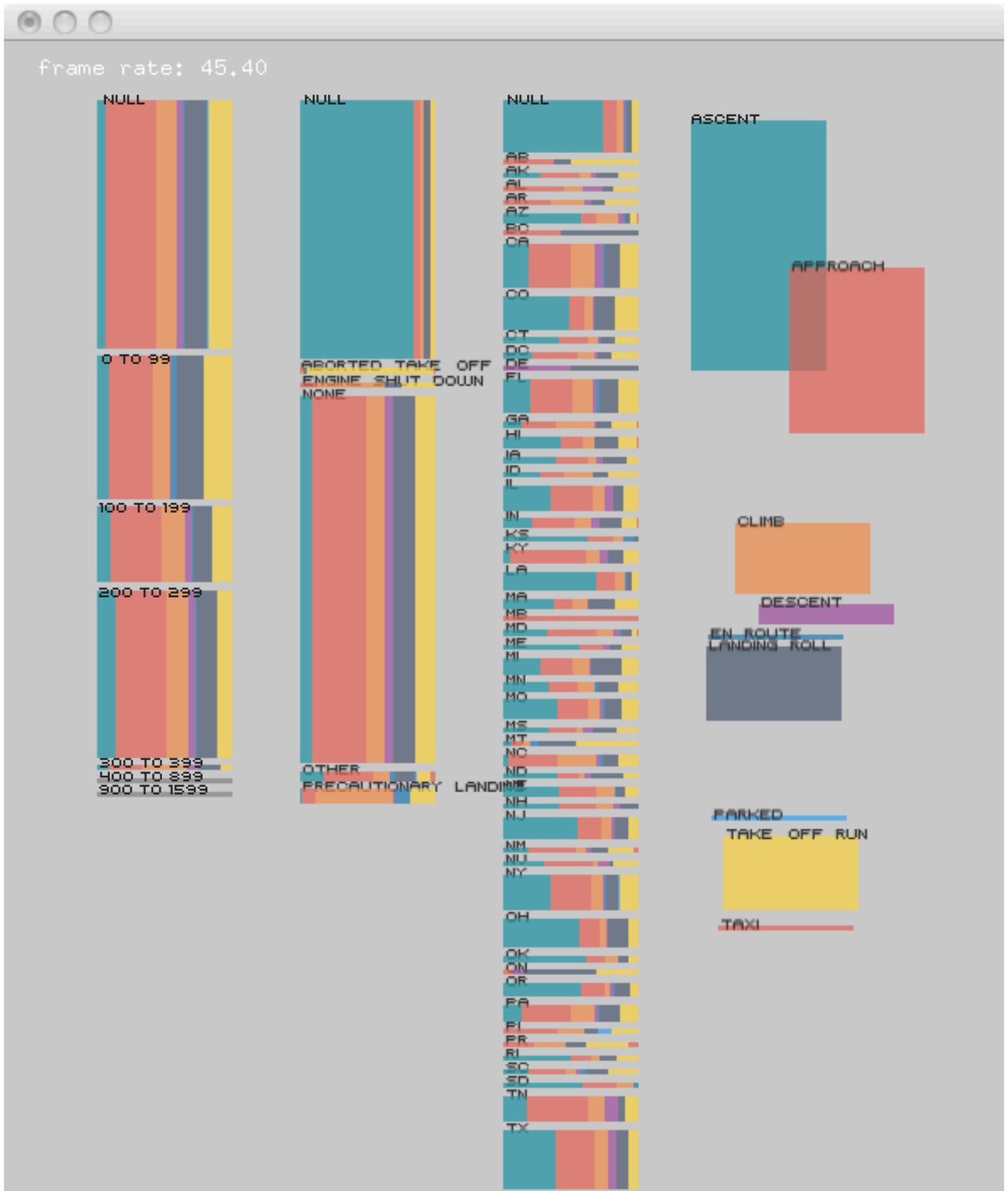


stacked bar charts turned around, and normalized

correlations shown through “color domination”

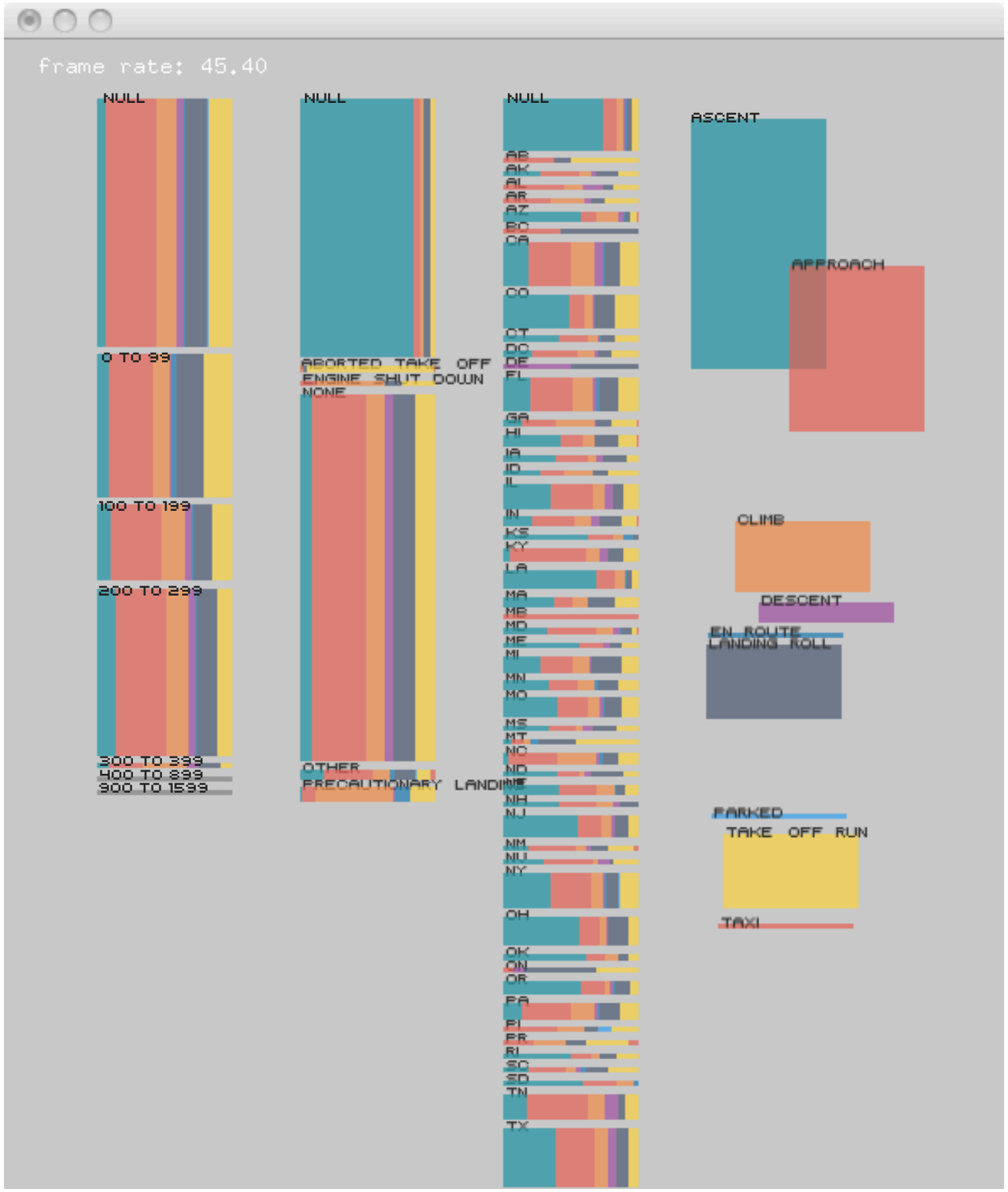
one *interested dimension* at a time, but shifts to others quickly
(more in tune with how attention works?)

my proposed design:



freedom in layout

my proposed design:

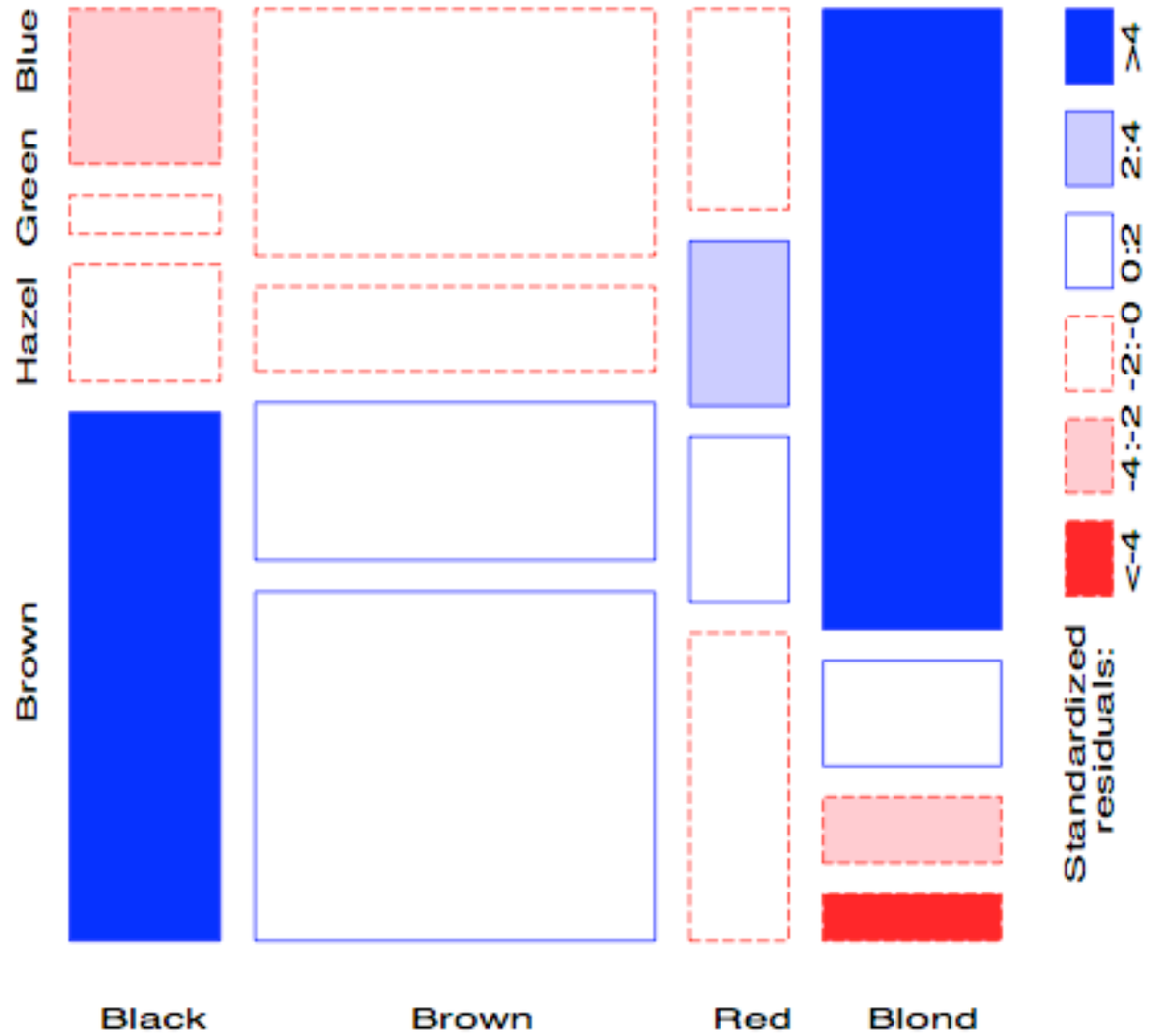


known issues so far:

- limited # of colors but, ordering helps

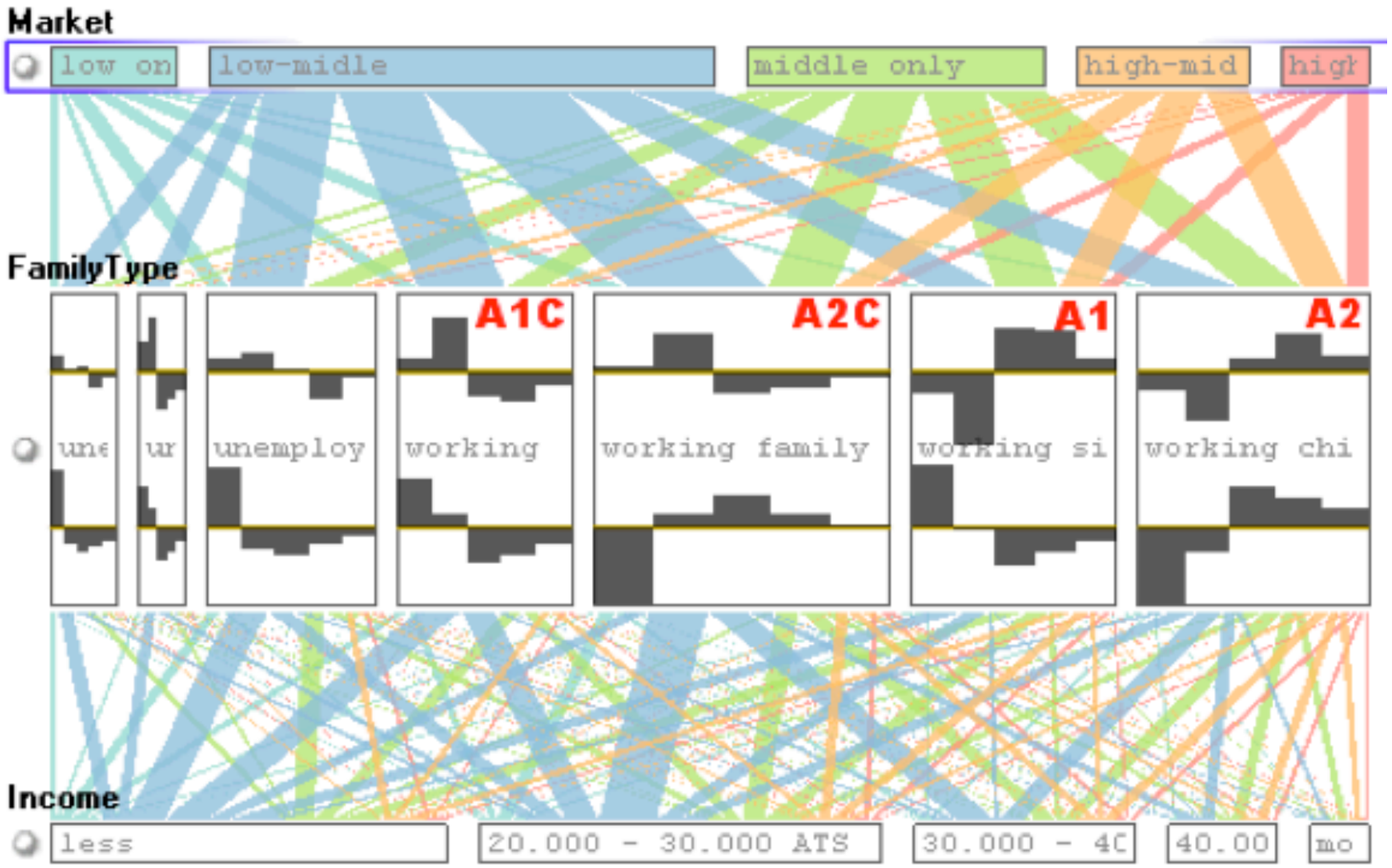
- correlations in numerical dimensions

previous work #2:
Mosaic Display



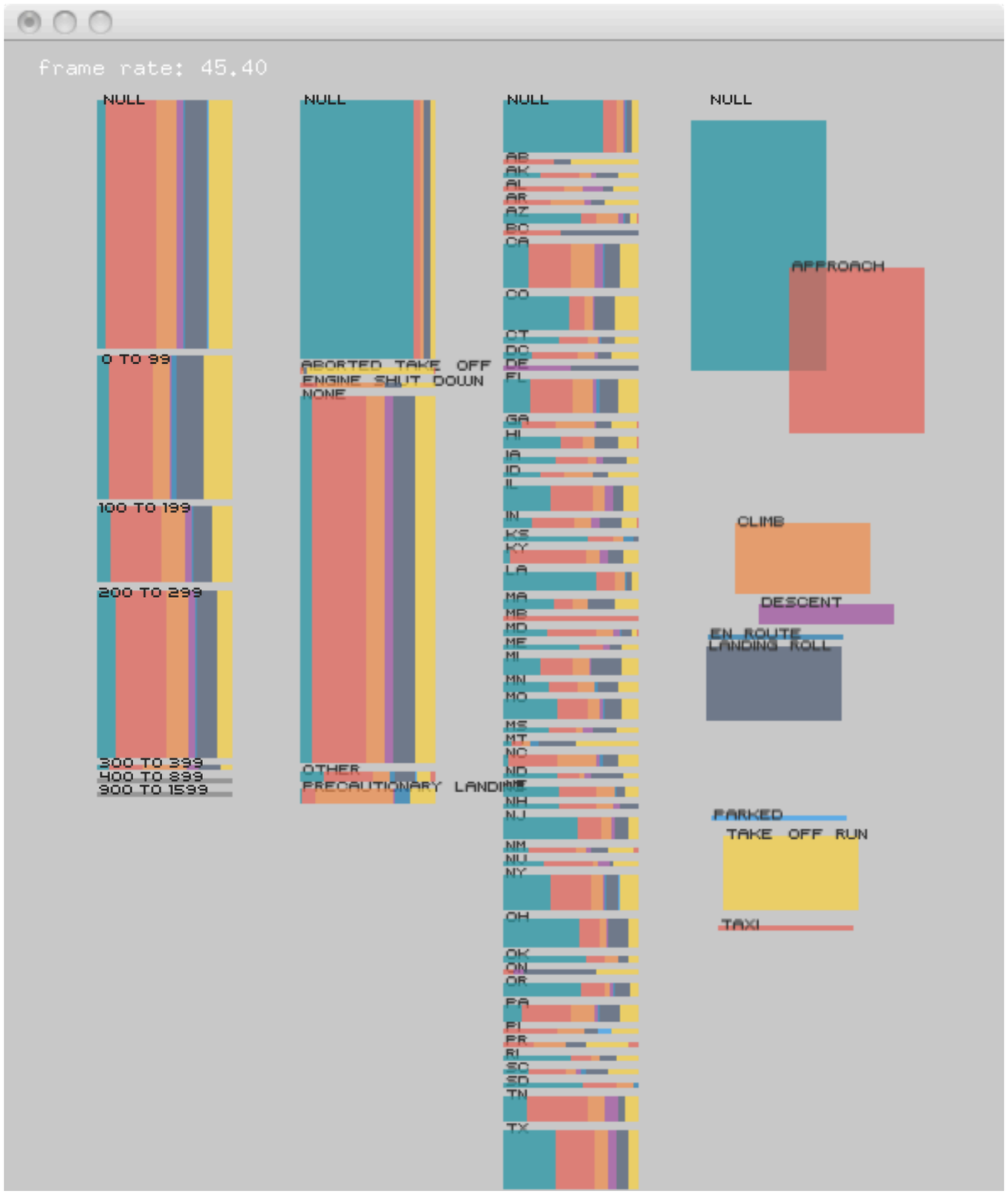
- correlation = area
- two dimensions at a time
- rigid layout

previous work #3:
Parallel Set



- correlation = edges + color
- messy edges

questions?


frame rate: 45.40
NULL
0 TO 99
100 TO 199
200 TO 299
300 TO 399
400 TO 899
900 TO 1599
NULL
ABORTED TAKE OFF
ENGINE SHUT DOWN
NONE
OTHER
PRECAUTIONARY LANDI
NULL
AB
AK
AL
AR
AZ
BC
CA
CO
CT
DC
DE
FL
GA
HI
IA
ID
IL
IN
KS
KY
LA
MA
MB
MD
ME
MI
MN
MO
MS
MT
NC
ND
NE
NH
NJ
NM
NU
NY
OH
OK
ON
OR
PA
PI
PR
RI
SC
SD
TN
TX
NULL
APPROACH
CLIMB
DESCENT
EN ROUTE
LANDING ROLL
PARKED
TAKE OFF RUN
TAXI