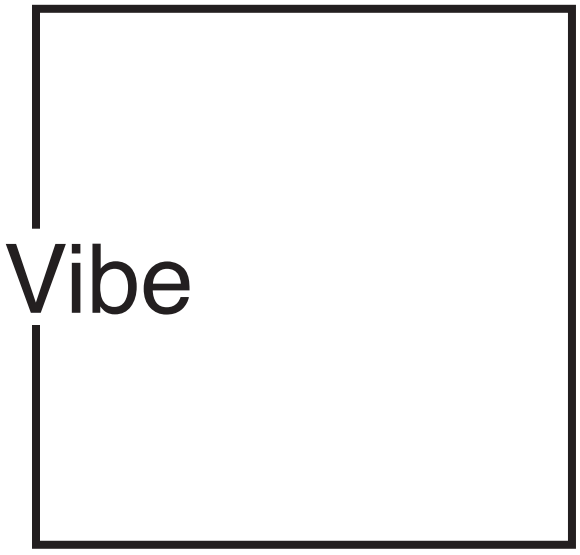



# ViBox

Brian Connolly | Jared Rosen

Problem

- Devices are unaware of the activity and energy levels of rooms
- Manual adjustment is needed to match music to the environment

Solution

- Intelligent system that can analyze a social space and determine Vibe
- Use VibeScore to create an intelligent, automatic music player

Music Players

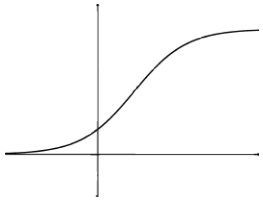
- iTunes
- Pandora
- Spotify

HVAC

- Nest
- Occupancy states from building-temperature wavelet analysis

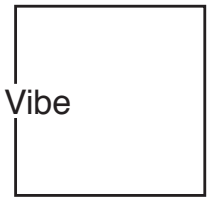
Automation and Security

- IFTTT
- XFINITY Home
- People tracking using anonymous binary sensors



VibeScore Algorithm

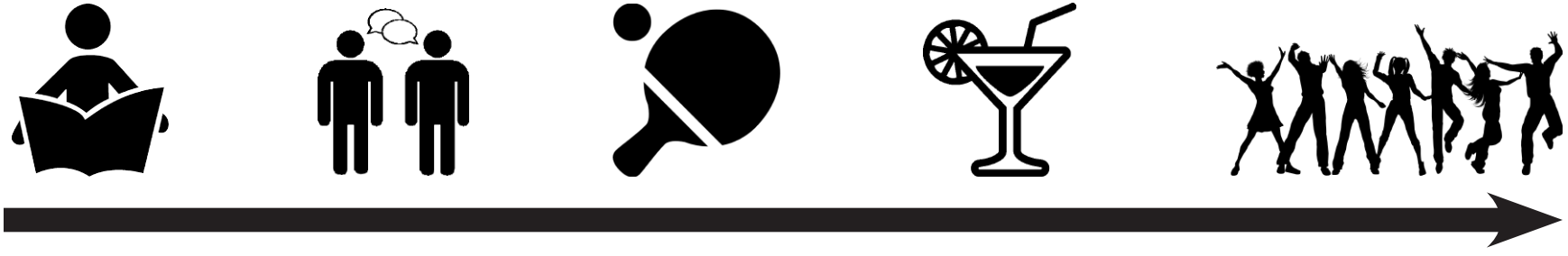
- Multinomial logistic regression to map temperature, motion, and sound data to VibeCluster




ViBox Implementation

- Intel Galileo to gather data, compute VibeScore, and run web server
- Website to provide a user interface and play music

# VibeClusters



VibeCluster 0
Studying

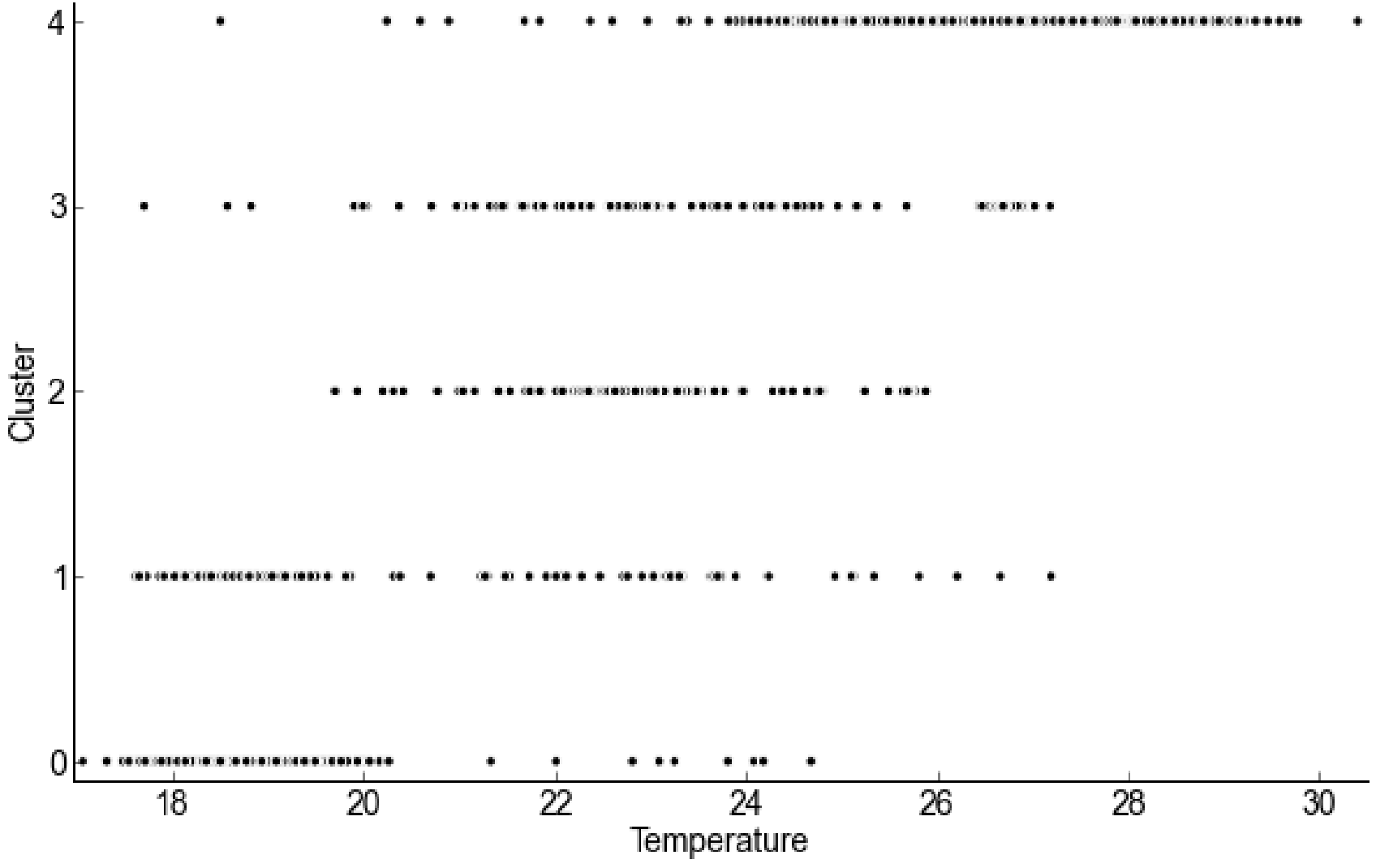
VibeCluster 1
Chatting

VibeCluster 2
Gaming

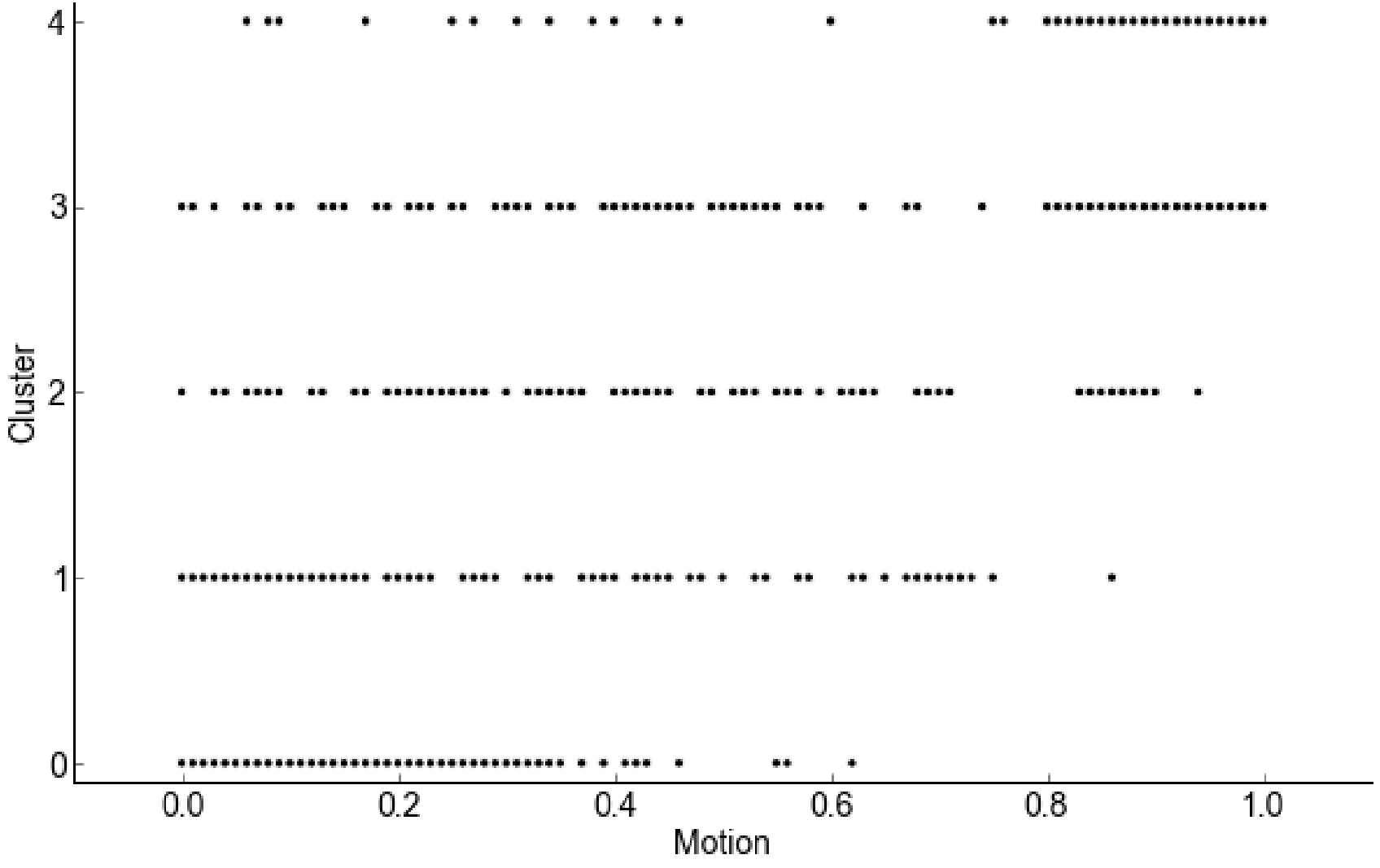
VibeCluster 3
Entertaining

VibeCluster 4
Partying

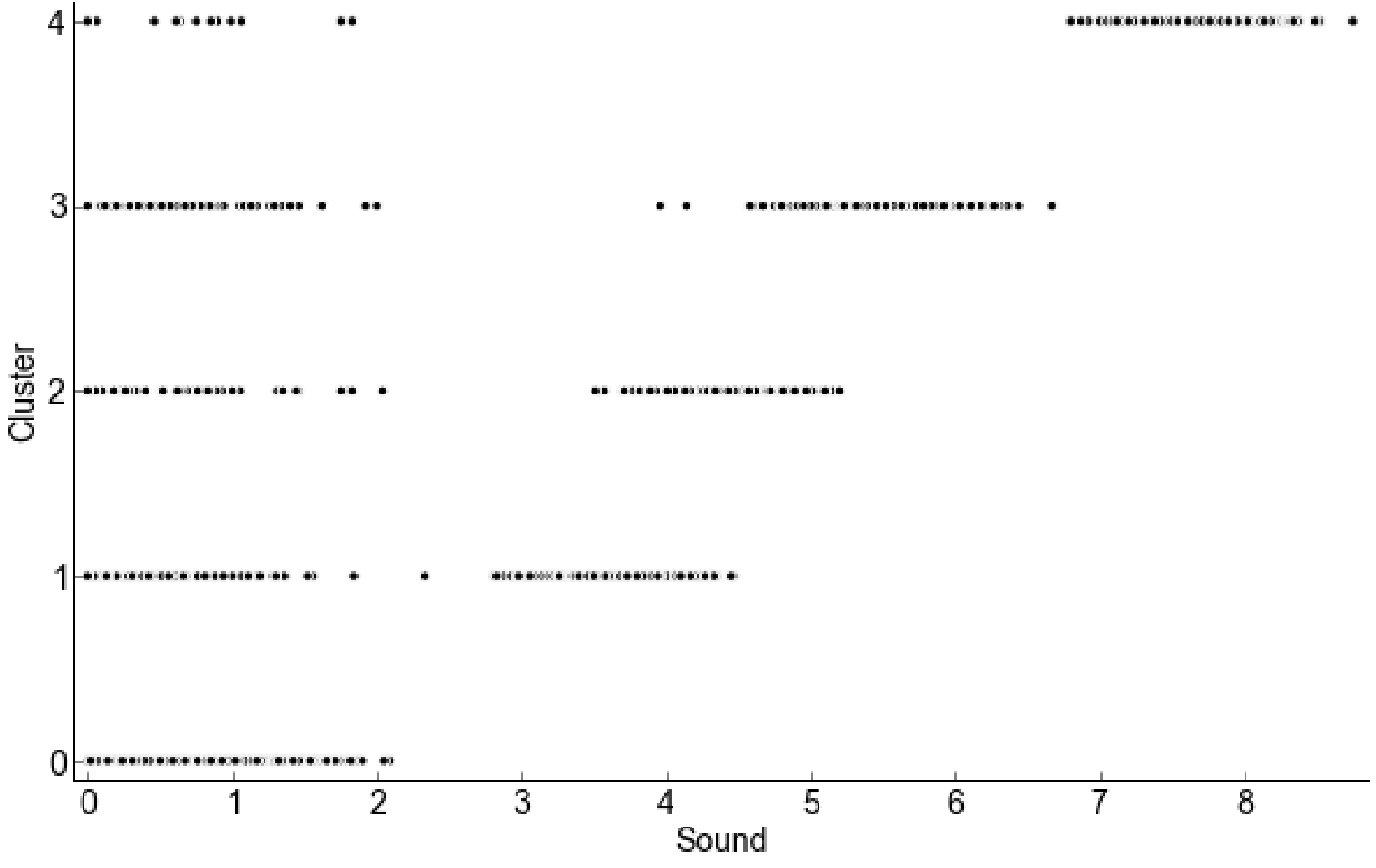
# Temperature vs. VibeCluster



# Motion vs. VibeCluster



# Sound vs. VibeCluster



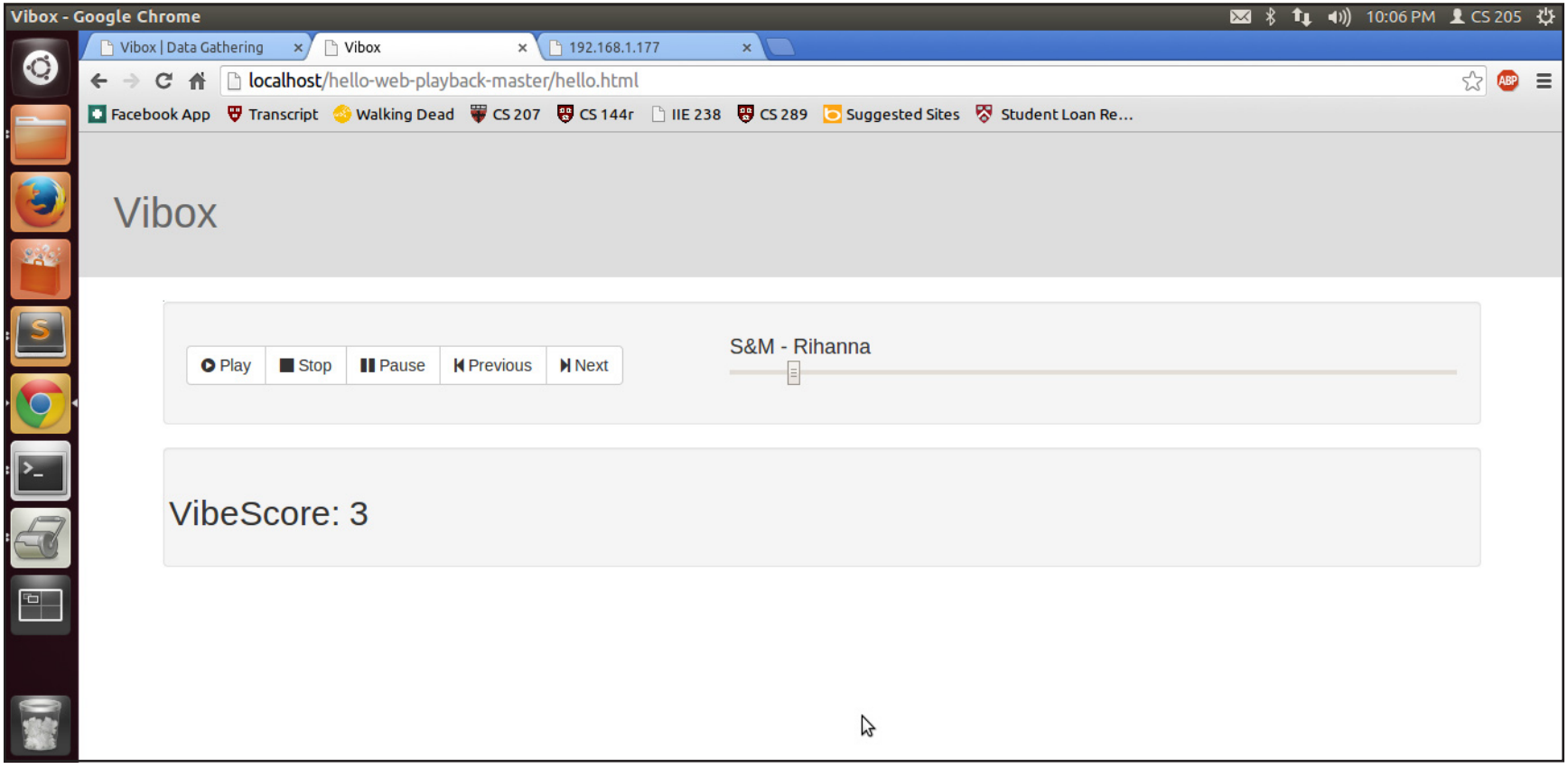
VibeCluster is computed using a linear predictor function found from a multinomial logistic regression

$$f(k, i) = \beta_{0,k} + \beta_{1,k}X_{1,i} + \beta_{2,k}X_{2,i} + \ldots + \beta_{M,k}X_{M,i}$$

```
f(VibeCluster0, [t, m, s]) =  24.72845283 + -1.15333363t +  -3.71792208m + -0.49171832s
f(VibeCluster1, [t, m, s]) =  -0.06759773 + -0.07206813t +   4.23302739m + -0.63240759s
f(VibeCluster2, [t, m, s]) =  16.29566512 + -1.39842133t +  27.66595494m + -1.48733955s
f(VibeCluster3, [t, m, s]) = -53.52717075 +  2.14403771t +  13.26410391m + -2.50873293s
f(VibeCluster4, [t, m, s]) =  -1.44469199 + -0.36674018t + -16.59929285m +  3.96694576s
```

- Does not assume independence between input variables
- Resistant to the effects of outlier data points
- Dependent variable cannot be predicted from one independent variable
- Each input data point has a single class

# Demo


Vibox - Google Chrome
10:06 PM
CS 205
Vibox | Data Gathering
Vibox
192.168.1.177
localhost/hello-web-playback-master/hello.html
Facebook App
Transcript
Walking Dead
CS 207
CS 144r
IIE 238
CS 289
Suggested Sites
Student Loan Re...
Vibox
Play
Stop
Pause
Previous
Next
S&M - Rihanna
VibeScore: 3

VibeCluster: 0

VibeCluster: 1

VibeCluster: 1

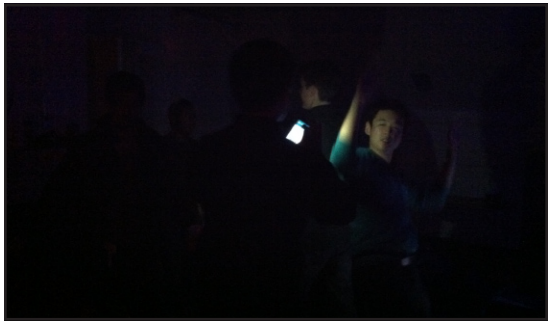
VibeCluster: 2

VibeCluster: 3

VibeCluster: 3

VibeCluster: 3

VibeCluster: 3



VibeCluster: 4

# Results

| | | Predicted VibeCluster | | | | |
|---|---|---|---|---|---|---|
| | | **0** | **1** | **2** | **3** | **4** |
| **Actual VibeCluster** | **0** | 0.99 | 0.01 | 0.00 | 0.00 | 0.00 |
| | **1** | 0.07 | 0.90 | 0.02 | 0.01 | 0.00 |
| | **2** | 0.00 | 0.03 | 0.93 | 0.03 | 0.01 |
| | **3** | 0.01 | 0.02 | 0.01 | 0.95 | 0.01 |
| | **4** | 0.00 | 0.01 | 0.01 | 0.02 | 0.96 |

- Accurately predict VibeCluster in >9 out of 10 trials
- We believe our under-predictions are due to difficulties detecting low sound levels
- We believe our over-predictions are the result of the large effect of temperature on VibeScore

# Next Steps

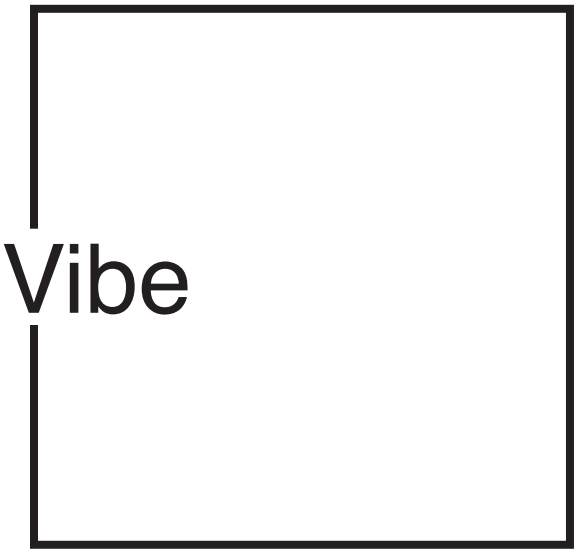

Refine design and VibeScore algorithm

Deploy product

Create a VibeScore API

Add support for multiple ViBoxs in the same room

Create an enterprise ViBox for office buildings




# Thank You

Brian Connolly | Jared Rosen