Visualizing Earthquake Simulation Data

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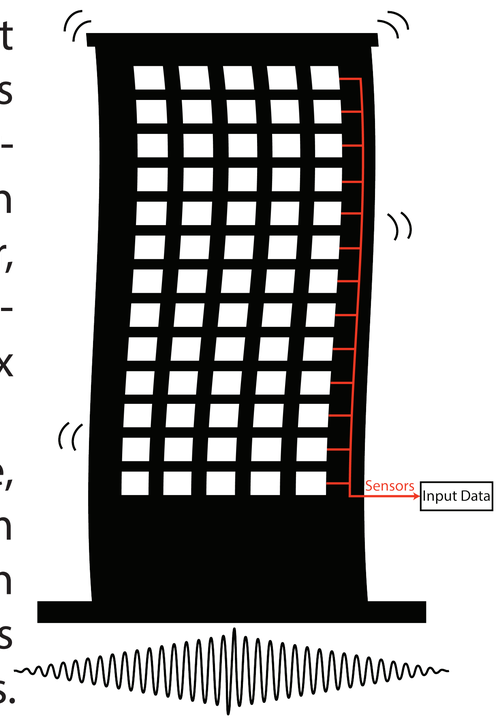
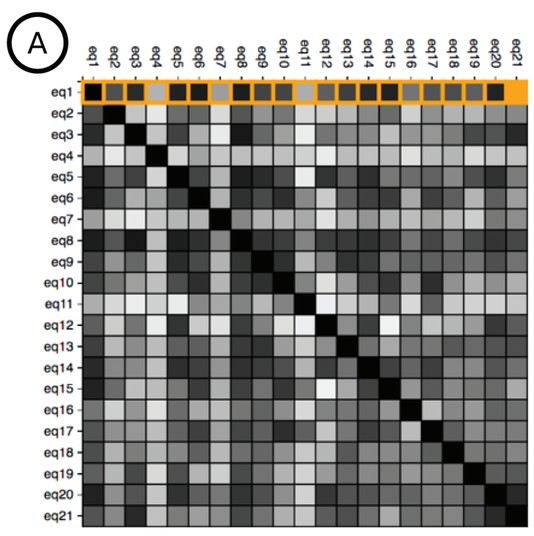
Problem

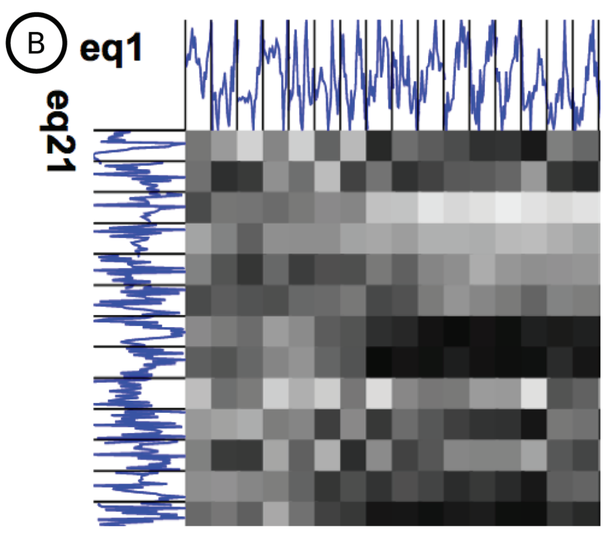
Computer simulations of the effect of earthquakes on built structures promise to let enigeerings understand different tradeoffs and design at an attracitvely low cost. However, The way in which a building responds to an earthquake is complex and controlled by multiple physical variables of insterest, for example, shear, moment and diaphragm forces. By putting sensors on each floor, we can collect these various simulation data through time series.

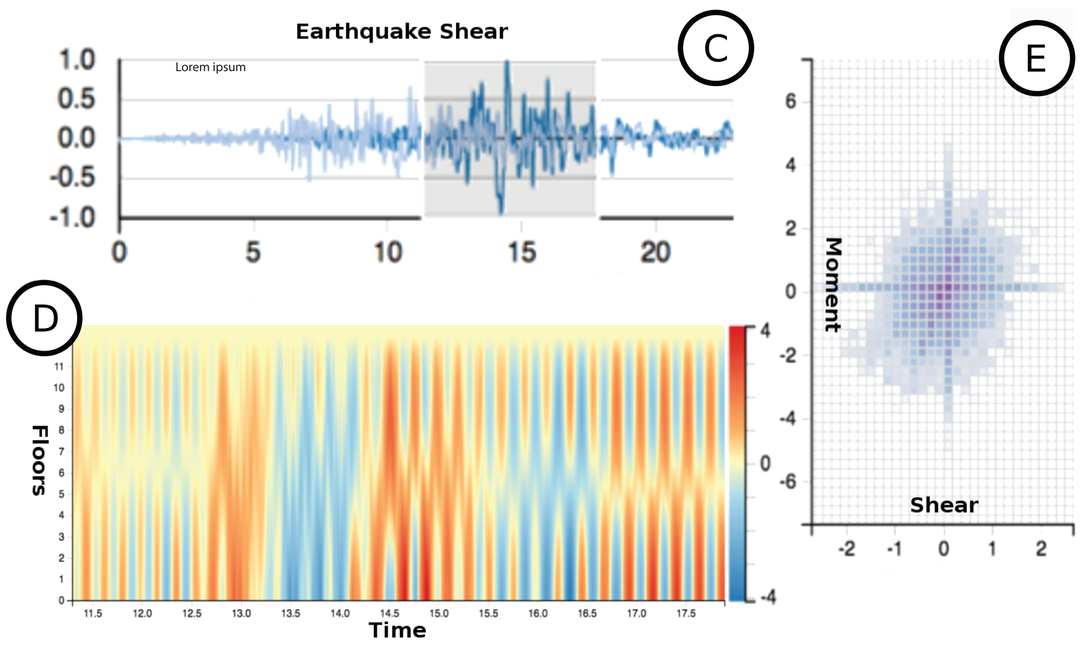


Can we show their differences?

(A) is a matrix diagram view showing the overall similarities of shear across 50 earthquake simulations. In addition, an earthquake simulation are compared to one another in (B).







Analysts can select a portion of the ground acceleration (C) and drill down into a specific earthquake simulation (D), to visualize the response of a single physical variable plotted over time (x coordinate) and building floor (y coordinate). Finally, a 2D histogram can be used to compare two different attributes over the same period of time.

Humans, Data, and Computers
http://hdc.cs.arizona.edu

Topic modelling can help identitfy time-varying multisignal evolution!

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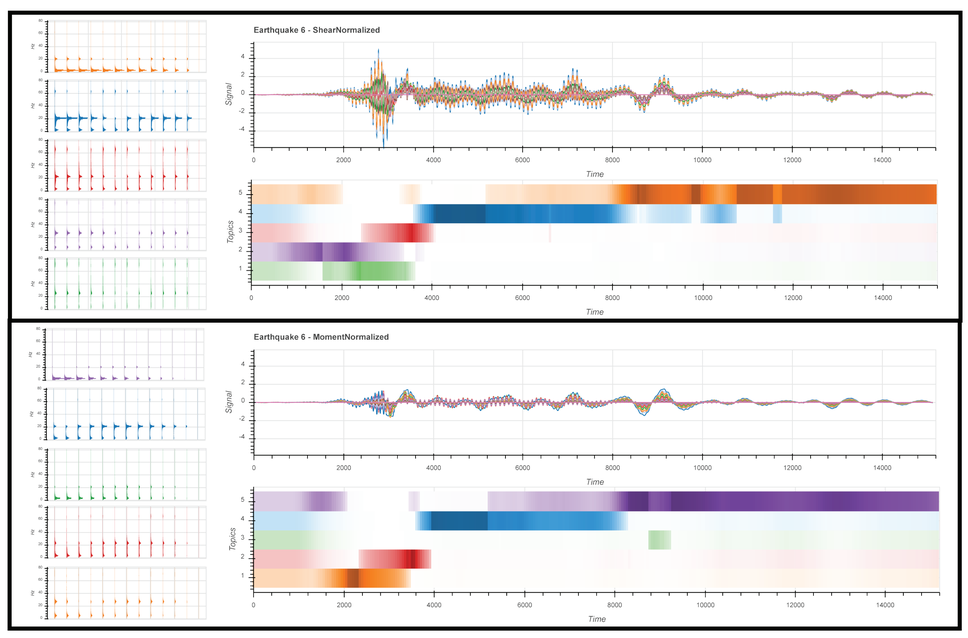

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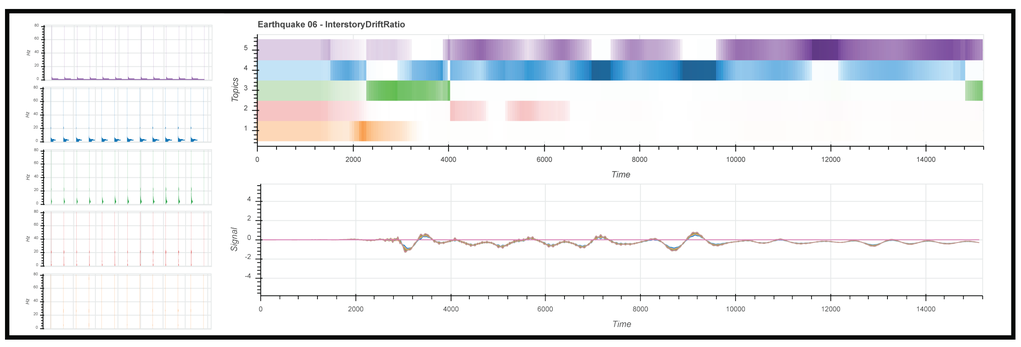

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References

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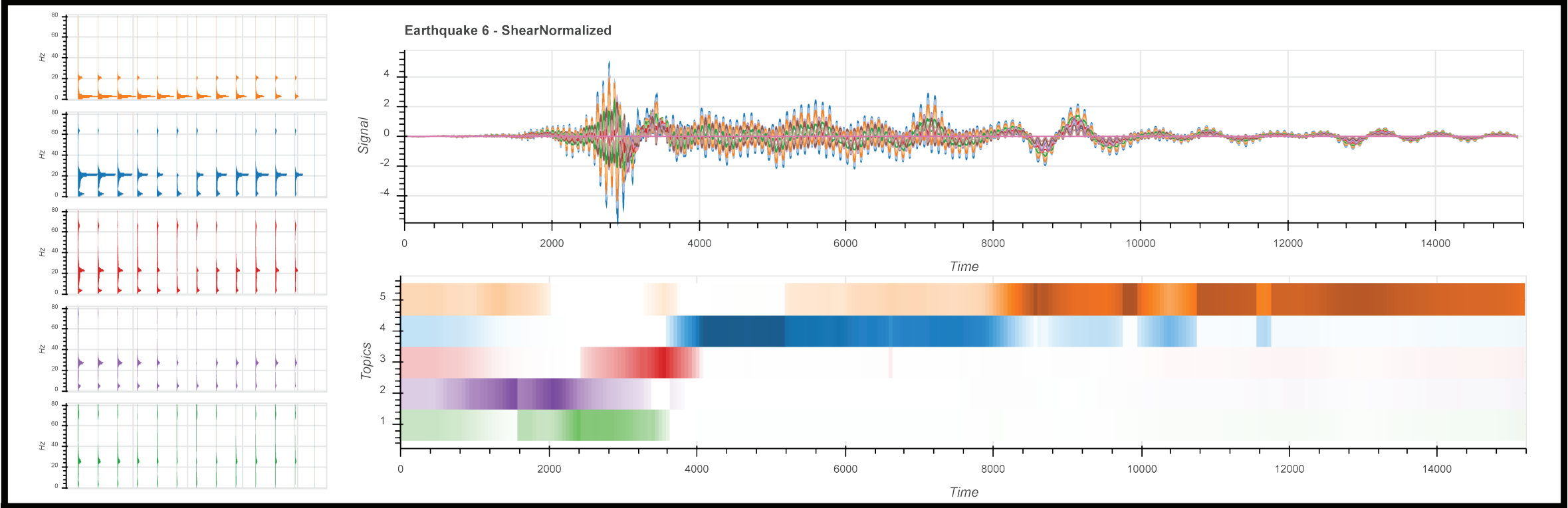
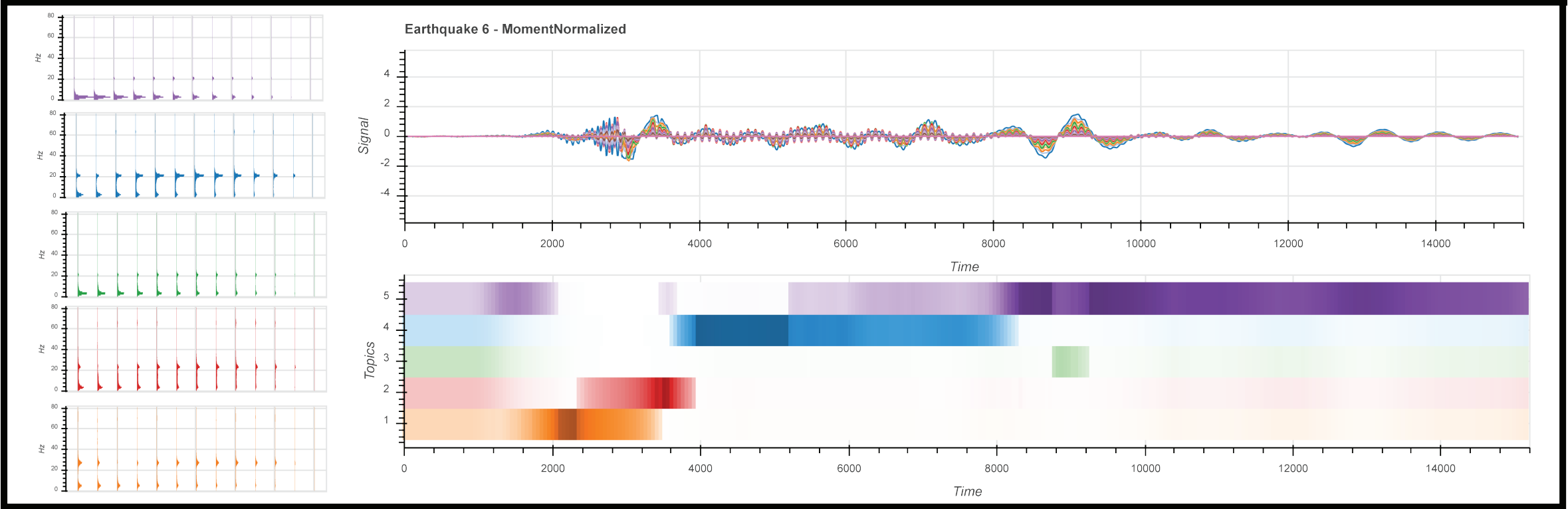
NSF AT&T The University of Arizona


Earthquake 6 - ShearNormalized
Signal
Time
Topics
Time


Earthquake 6 - MomentNormalized
Signal
Time
Topics
Time