Spatiotemporal Data Mining to Anticipate Tornado Formation
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Objectives
- Develop novel spatiotemporal relational data mining models to enable meteorologists to revolutionize their understanding of tornado development
- Apply the data mining models to multiple severe weather situations
- Bring the research into the classroom to provide authentic classroom examples of how CS can change the world. Improve retention and recruitment of underrepresented groups

Background
- Tornadoes are correctly warned 80% of the time BUT 80% of the warnings are false alarms. We want to improve prediction!
- Radars are limited in what they can observe. Prediction near limit with this system.
- We generate very high resolution simulations of storms and study these to develop a detailed model of how a storm evolves over space and time.

Preliminary Results
- Developed Spatiotemporal Relational Probability Trees
- Developed Spatiotemporal Relational Random Forests
- Applied SRPT & SRRF to multiple severe weather domains:
  - Convectively induced turbulence
  - Tornado development and fronts
  - Spread of drought

Relevant References
- McGovern, Amy; Supinie, Timothy; Gagne II, David John; Troutman, Nathaniel; Collier, Matthew; Brown, Rodger A.; Basara, Jeffrey; Williams, John. (under review) Augmenting Spatiotemporal Relational Random Forests for Use in Real-world Severe Weather Applications. Submitted to the Knowledge Discovery and Data Mining conference: KDD 2010.