Extreme Value Analysis of Kansas Temperature Data

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Understanding Climate Change in the Great Plains: Source, Impact, and Mitigation.
Outline

• Kansas weather stations and data source

• Project

• A strategic plan of stochastic and statistical modeling

• Exploratory data analysis
1. Kansas weather stations and data source

Weather data source

- National Oceanic and Atmospheric Administration (NOAA) http://www.noaa.gov/
  
  National Weather Service http://www.nws.noaa.gov/

  National Climatic Data Center (NCDC) http://www.ncdc.noaa.gov oa/ncdc.html

- High Plains Regional Climate Center (HPRCC) at University of Nebraska at Lincoln http://www.hprcc.unl.edu/
Kansas weather stations

Figure 2: Kansas weather stations
2. Project

Understanding Climate Change in the Great Plains: Source, Impact, and Mitigation (2009-2014)

PI: Charles Rice, Department of Agronomy, Kansas State University

Co-PIs:

Johannes Feddema, Department of Geography, University of Kansas

John A. Harrington, Department of Geography, Kansas State University

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3. **A strategic plan of stochastic and statistical modeling**

(i) Time series analysis of historical data at each station (Purely temporal)

(ii) Spatial statistical modeling at the fixed time (Purely spatial)

(iii) (Univariate) Spatio-temporal data analysis

(iv) (Multivariate, or vector) Spatio-temporal data analysis

   Weather data: Temperature, wind speed, wind direction, precipitation ...

   Related data: Agricultural, environment, public health ...

(v) Extreme weather events
4. Exploratory data analysis

Figure 3: Original Data: Dodge City daily low temperature between Jan. 1 and March 31
Figure 4: Original Data: Dodge City daily high temperature between June 1 and Aug. 31
Figure 5: Original Data: Dodge City daily high temperature between June 1 and August 31 with smoothing parameter 0.00081282
Dodge June 1 - August 31 Probability Day is Hottest of the Year

![Graph showing probability distribution for the hottest day of the year from June 1 to August 31. The graph compares two periods: 1973-1999 and 2000-2009.](image-url)
Figure 7: Original Data: Dodge City daily high temperature between June 1 and Aug. 31

Doved June 1 - August 31 Probability Day is Hottest of the Year
Figure 8: Original Data: Hays daily high temperature between June 1 and Aug. 31
Figure 9: Original Data: Hays daily low temperature between Jan. 1 and March 31
Figure 10: Original Data: Manhattan daily high temperature between June 1 and Aug. 31
Figure 11: Original Data: Manhattan daily low temperature between Jan. 1 and March 31
Figure 12: Original Data: Topeka daily high temperature between June 1 and Aug 31
Figure 13: Original Data: Topeka daily low temperature between Jan. 1 and March 31
Figure 14: Original Data: Wichita daily low temperature between Jan. 1 and March 31
Figure 15: Original Data: Wichita daily high temperature between June 1 and Aug. 31