The availability of large-scale data invades all areas of econophysics, sociodynamics, as well as bioinformatics and poses methodological challenges for data analysis, visualization and modeling. This session provides an overview how methods adapted from statistical physics and network analysis deepen the understanding of the interaction of humans through language and social media, their emergent collective behaviour the assessment of risks and the detection of crises. (Session compiled by Kerstin Kämpf, TU Darmstadt and Jens Christian Clausen, U Lübeck.)

There have been more than 200 wars since the start of the 20th century, leading to about 35 million battle deaths. However, efforts at forecasting conflicts have so far performed poorly for lack of fine-grained and comprehensive measures of geopolitical tensions. Here, we developed a weekly risk-index by analyzing a comprehensive dataset of historical newspaper articles for 166 countries over the past century, which we then tested on a data of all conflicts within and between countries recorded since 1900. Using only information available at the time, we could predict the onset of a war within the next year with up to 85% confidence; we also forecasted over 70% of large-scale wars, while issuing false alarms in only 16% of observations. Predictions were improved up to one year prior to interstate wars, and six months prior to civil wars, giving policy-makers significant additional warning time.

### SOE 22.1 Thu 10:00 H37

**Network analysis literacy**

**Invited Talk**

- **Katharina Anna Zweig**, TU Kaiserslautern, Computer Science Department, Graph theory and complex network analysis, Gottlieb-Daimler-Str. 48, 67663 Kaiserslautern, Germany

Big data often comes in a form that relates objects or subjects to each other. Examples for this kind of data describe interactions between proteins or people, plane connections between cities, or references from articles to other articles. Relational data is best analyzed by network analytic measures which have been proven useful in very different disciplines; high hopes have been put in them to finally understand the complex systems surrounding us. While network analysis is often very successful, in this talk I will show that not all relational data should actually be represented as a network and that not all measures are likely to give reasonable results in all contexts. I will discuss the "trilemma of social network analysis" which puts an emphasis on matching the data and its network representation, the method to use, and the question to be answered.

### SOE 22.2 Thu 10:30 H37

**Topical Talk**

- **Sune Lehmann**, Yong-Yeol Ahn, Alan Mislove, Jukka-Pekka Onnela, and Niels James Rosenquist

Using the popularity of articles in the New York Times to map the collective mood of the United States, the mood of each tweet was inferred using a simple word-list (ANEW), and the results are represented as density-preserving cartograms. A cartogram is a map in which the mapping variable (in this case, the number of tweets) is substituted for the true land area. Thus, the geometry of the actual map is altered so that the shape of each region is maintained as much as possible, but the area is scaled in order to be proportional to the number of tweets that originate in that region. For the final part of the talk, we will discuss the importance of visualization in analysis of Big Data as well as new developments in the area of Big Data.
contrast, the enormous potential of the Internet has been much less uti-
lized by behavioral scientists studying individual behaviors and their
underlying cognitive processes. In this presentation, I will discuss sev-
eral examples of how web-based research methods can both aid the
study of cognition and directly clarify its contents. In particular, I
will highlight 4 distinct ways in which cognitive scientists can utilize
the Internet: (1) running web-based experiments with large samples
of human participants (at low cost); (2) using online games to collect
data from intrinsically motivated participants (for free); (3) studying
*naturally* occurring online individual behaviors; (4) measuring the
contents of memory and the dynamics of attention over time. I will
conclude by discussing how students and researchers with a quantita-
tive background (e.g., physicists) can utilize the web to advance our
understanding of human cognition.