



中国R会  
The China-R Conference

# 第14届中国R会

The 14th China-R Conference (Beijing)

**地点:**

线下会场:北京-中国人民大学

线上会场:腾讯会议

**时间:2021.11.20--2021.11.21**

经过十四年的磨砺，中国 R 会议又踏上了新的征程。每当这个时候，各位志同道合的朋友以 R 为相聚的理由，从数据科学的各类学术领域而来、从大数据的各种应用行业而来、从天南海北的各条奋斗战线而来，欢聚一堂，共襄盛举。这是 R 的独特魅力。R 的一个核心设计理念是“人的时间永远比机器的时间宝贵”，具有深厚的人文精神，其工程化应用又秉承了“总是有多种方法来做同一件事”的思想，极具包容性。它专注于数据科学和统计建模，保持自己的勃勃生机，又主动和其他的优秀工具融合，让大数据时代的舞台群芳竞艳。这也正如统计学，最大的好处是“可以在所有学科的后院玩耍”。参加会议的朋友们都热爱 R，但不执着 R，甚至不用 R，大有“圣人不凝滞于物”的境界。



这么多年来，数据领域的各种热门词汇层出不穷，和 R 比较的工具也换了好几轮，但 R 和 R 会一直在这里，这里没有人想一统天下，只想解决现实问题，因为我们知道“所有模型都是错误的，但有些是有用的”。迎着国家产业升级的历史进程和大数据时代的热潮，此次 R 会的主题包含但不限于：数理统计学、数据科学与大数据、人工智能的相关理论及其在各行各业的具体应用，包括机器学习、医疗健康、金融经济、软件工具、天文地理、社交网络等诸多话题。我们真诚地欢迎您的到来，一同感受数据科学为这个时代带来的惊喜与挑战。

统计之都敬上  
2021年 11月 20日



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PROFESSION, HUMANITY & INTEGRITY

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<https://cosx.org/>

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中国人民大學  
RENMIN UNIVERSITY OF CHINA

统计学院  
SCHOOL OF STATISTICS

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中国人民大学应用统计科学研究中心  
Center for Applied Statistics of Renmin University of China

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2017 2020 2014

RStudio



RStudio	2008	JJ Allaire	R	Hadley Wickham
RStudio	RStudio	R		
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Google Hangouts  
23 <http://meetup.cos.name/>

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Dynamic Documents with R and knitr (2nd edit on)  
Implementing Reproducible Research bookdown: Authoring  
Books and Technical Documents with R Markdown R  
R , ggplot2 R  
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editor@cosx.org

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**R**





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8:40-9:00		
9:00-9:45		UCL 1926-1939
9:45-10:30		
10:30-10:40		
10:40-11:10		
11:10-11:40		R

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9:00-9:30		
9:30-10:00		Statistical Estimation and Inference via Local SGD in Federated Learning
10:00-10:10		
10:10-10:40		Non-crossing Distributional Reinforcement Learning
10:40-11:10		

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## R Python

9:00-9:30		echarts4r:
9:30-10:00		ShinyProxy Shiny Apps
10:00-10:30		Tidyverse
10:30-10:40		
10:40-11:10		R for Clinical Study Reports and Submission
11:10-11:40		

## 20

R R R

9:00-9:30		
9:30-10:00		R
10:00-10:30		Htmlwidget R
10:30-10:40		
10:40-11:10		Using R in VS Code
11:10-11:40		R gm

## 20

14:00-14:30		Jointly Dynamic Topic Model for Recognition of Lead-lag Relationship in Two Text Corpora
14:30-15:00		Bayesian Spatial Blind Source Separation via the Thresholded Gaussian Process
15:00-15:30		

15:30-15:40		
15:40-16:10		AI+
16:10-16:40		

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Intergovernmental Panel on Climate Change (IPCC)

14:00-14:35		
14:35-15:10		UAVEE-Net:
15:10-15:20		
15:20-15:55		
15:55-16:30		

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14:00-14:30		
14:30-15:00		Knowledge-Infused Sparse Learning for Quality Improvements in Smart Manufacturing Systems
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15:40-16:10		R
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16:10-16:40		Shiny

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9:00-9:30		2018
9:30-10:00		Social media informat on sharing for natural disaster response
10:00-10:30		The remote sensing image percept on-cognit on framework for the large-scale disasters: algorithms and applicat ons
10:30-10:40		
10:40-11:10		
11:10-11:40		

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9:00-9:30		abess:
9:30-10:00		Self-Organized Hawkes Processes

10:00-10:30		High-Dimensional Instrumental Variables Additive Model
10:30-10:40		
10:40-11:10		Distributed Community Detection for Large Scale Networks Using Stochastic Block Model
11:10-11:40		

## 21

9:00-9:30		Google
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10:40-11:10		
11:10-11:40		

11月20日上午	11月20日下午	11月21日上午
<p>主会场</p> <p>线下会场：明德主楼 1030</p> <p>腾讯会议 ID：849677225</p>	<p>数据科学专场</p> <p>线下会场：明德主楼 1030</p> <p>腾讯会议 ID：601590474</p>	<p>灾害风险专场</p> <p>线下会场：明德主楼 1031</p> <p>腾讯会议 ID：176729652</p>
<p>机器学习专场</p> <p>线下观看地址：明德主楼 1001</p> <p>腾讯会议 ID：947208588</p>	<p>气候变化专场</p> <p>线下会场：明德主楼 1031</p> <p>腾讯会议 ID：652697869</p>	<p>学生专场</p> <p>线下会场：明德主楼 1030</p> <p>腾讯会议 ID：596401958</p>
<p>软件工具专场（一）</p> <p>线下观看地址：明德主楼 1031</p> <p>腾讯会议 ID：979877494</p>	<p>工业大数据专场</p> <p>线下观看地址：明德主楼 1001</p> <p>腾讯会议 ID：519869785</p>	<p>数据科学企业应用专场</p> <p>线下观看地址：明德主楼 1016</p> <p>腾讯会议 ID：400752859</p>
<p>软件工具专场（二）</p> <p>线下观看地址：明德主楼 1016</p> <p>腾讯会议 ID：472359905</p>	<p>统计软件专场（三）</p> <p>线下观看地址：明德主楼 1016</p> <p>腾讯会议 ID：437659984</p>	

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# Prediction, Representation and Computation—The Nature of Machine Learning

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Journal of Machine Learning Research

2021 9

Leo Breiman

2001

“Statistical Modeling: The Two Cultures”

“Data Modeling Culture”

“Algorithmic Modeling Culture”

Bradley Efron 2019 ISP(International Statistical Prize) lecture

“Prediction, Estimation, and Attribution”

“Pure Prediction Algorithms”

“estimation”

“attribution”  
representation”

“prediction, computation, and

representation”

blessing”

“curse of dimensionality”

“dimensionality

“Data Modeling

Culture” “ Algorithmic Modeling Culture”

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Biomedical Informatics, Computer Methods and Programs in Biomedicine  
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## Statistical Estimation and Inference via Local SGD in Federated Learning

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NeurIPS, ICLR, ICML

Federated Learning (FL) makes a large amount of edge computing devices (e.g., mobile phones) jointly learn a global model without data sharing. In FL, data are generated in a decentralized manner with high heterogeneity. This paper studies how to perform statistical estimation and inference in the federated setting. We analyze the so-called Local SGD, a multi-round estimation procedure that uses intermittent communication to improve communication efficiency. We first establish a functional central limit theorem that shows the averaged iterates of Local SGD weakly converge to a rescaled Brownian motion. We next provide two iterative inference methods: the plug-in and the random scaling. Random scaling constructs an asymptotically pivotal statistic for inference by using the information along the whole Local SGD path. Both the methods are communication efficient and applicable to online data. Our theoretical and empirical results show that Local SGD simultaneously achieves both statistical efficiency and communication efficiency.

## Non-crossing Distributional Reinforcement Learning

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JASA, Biometrics, Nature Genetics, NeurIPS, IJCAI, ICDM  
award, New Researcher Award, Barry H. Margolin

Although distributional reinforcement learning (DRL) has been widely examined in the past few years, there are two open questions people are still trying to solve. One is how to ensure the validity of the learned quantile function, the other is how to efficiently utilize the distributional information. To address these two issues, we first propose a non-decreasing quantile function architecture to guarantee the monotonicity of the obtained quantile estimates and then design a general exploration framework for DRL which utilizes the entire distribution of the quantile function. By comparing with some competitors, we are able to show that our method can achieve better performance on Atari 2600 Games especially in some hard-explored games.

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ACL CIKM  
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RMarkdown RStudio bookdown blogdown Shiny  
<https://yihui.org>

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—echarts4r

**ShinyProxy** **ShinyApps**

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ShinyProxy Open Analytics Java  
 Shiny Apps App ShinyProxy Docker  
 Docker RStudio Connect (Shiny  
 Server)

## Tidyverse

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Tidyverse

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## R for Clinical Study Reports and Submission

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Yilong Zhang, Ph.D. is a statistician from Merck. Yilong works on late-stage clinical trial development in diabetes, cardiovascular, and oncology. He also works with a group of statisticians and programmers to demonstrate the capability of using R for regulatory submission. Yilong has published 20+ peer-reviewed papers including statistical methods in study design, missing data, and survival analysis. Before joining Merck, he earned Ph.D. degree in Biostatistics at New York University.

The use of open-source R is evolving in drug discovery, research and development for study design, data analysis, visualization, and report generation in the pharmaceutical industry. The ability to produce tables, listings and figures (TLFs) in customized rich text format (RTF) using R is crucial to enhance the workflow of using Microsoft Word to assemble analysis results. We developed an R package, r2rt, that standardizes the approach to generate highly customized TLFs in RTF format. Code examples are provided to create customized RTF tables and figures with highlighted features. Based on the TLFs generated by r2rt package, we further discuss a proposed process to submit the works to regulatory agency using the pkglite R package. The work is available in <https://r4csr.org/>.

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Journal of Operational Research

Journal of Computational and Graphical Statistics European  
Journal of Business and Economic Statistics

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tion, plotly, moveVis R animation, gganima-

**Htmlwidget R**

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https://www.jienamdellan.com/

Htmlwidgets R JavaScript R  
 JavaScript RMarkdown ShinyWeb  
 fashCard https://github.com/jienagu/fashCard faq https://github.com/jienagu/faq  
 JavaScript R

## Using R in VS Code

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VS Code R RLanguage Server MVP R  
 R data.table, lintr 2016 Learning R Programming  
 R

As Visual Studio Code was ranked the most popular development environment in the Stack Overflow 2021 Developer survey, we have been constantly improving the R support in VS Code in the recent two years. In this talk, I will introduce the powerful code editor specifically for R users and focus on the vscode-R extension with its development and demonstrate its powerful code editing features based on the R language server and flexible interactivity with one or multiple R sessions.

## R gm

1110 1140



(science-based course designer)

non-cognitive factors

R R gm  
<https://flujoo.github.io/en/my-music-album-night/>

R gm

RMarkdown

Journal of American Statistical Association, The Canadian Journal of Statistics, Statistics and Probability Letters, Knowledge-Based Systems, Statistics and Its Interface, Journal of Electronic Commerce Research, Public Personnel Management, Journal of Advertising Research, SSCI/SCI

## **Jointly Dynamic Topic Model for Recognition of Lead-lag Relationship in Two Text Corpora**

**1400-1430**



Journal of Econometrics, Journal of Business and Econometric Statistics, Journal of Machine Learning Research,

Topic evolution modeling has received significant attention in recent decades. Although various topic evolution models have been proposed, most studies focus on the single document corpus. However in practice, we can easily access data from multiple sources and also observe relationships between them. Then it is of great interest to recognize the relationship between multiple text corpora and further utilize this relationship to improve topic modeling. In this work, we focus on a special type of relationship between two text corpora, which we define as the "lead-lag relationship". This relationship characterizes the phenomenon that one text corpus would influence the topics to be discussed in the other text corpus in the future. To discover the lead-lag relationship, we propose a jointly dynamic topic model and also develop an embedding extension to address the modeling problem of large-scale text corpus. With the recognized lead-lag relationship, the similarities of the two text corpora can be figured out and the quality of topic learning in both corpora can be improved. We numerically investigate the performance of the jointly dynamic topic modeling approach using synthetic data. Finally, we apply the proposed model on two text corpora consisting of statistical papers and the graduation theses. Results show the proposed model can well recognize the lead-lag relationship between the two corpora, and the specific and shared topic patterns in the two corpora are also discovered.

## **Bayesian Spatial Blind Source Separation via the Thresholded Gaussian Process**

**1430-1500**



Emory

Blind source separation (BSS) aims to separate latent source signals from their mixtures. For spatially dependent signals in high dimensional and large-scale data, such as neuroimaging, most existing BSS methods do not take into account the spatial dependence and the sparsity of the latent source signals. To address these major limitations, we propose a Bayesian spatial blind source separation (BSP-BSS) approach for neuroimaging data analysis. We assume the expectation of the observed images as a linear mixture of multiple sparse and piece-wise smooth latent source signals, for which we construct a new class of Bayesian nonparametric prior models by thresholding Gaussian processes. We assign the von Mises-Fisher priors to mixing coefficients in the model. Under some regularity conditions, we show that the proposed method has several desirable theoretical properties including the large support for the priors, the consistency of joint posterior distribution of the latent source intensity functions and the mixing coefficients, and the selection consistency on the number of latent sources. We use extensive simulation studies and an analysis of the resting-state fMRI data in the Autism Brain Imaging Data Exchange (ABIDE) study to demonstrate that BSP-BSS outperforms the existing alternatives for separating latent brain networks and detecting activated brain activation in the latent sources.

**1500-1530**



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Econometrics, Journal of the American Statistical Association, Journal of Business and Economic Statistics, Journal of

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 DasPy <https://github.com/DasPy>

**UAVEE-Net:**



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IEEE INFORMS ACM

**1400 1430**



University of Iowa

IEEE Transactions on Sustainable Energy

Journal of

Intelligent Manufacturing & Management

IEEE Power Engineering Society Letters, Industrial Engineering

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**Knowledge-Infused Sparse Learning for Quality Improvements in Smart Manufacturing Systems**

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IEEE, ASME, IISE INFORMS

<https://sites.google.com/view/juandu/home>.

The rapid development of sensing and computing technologies has resulted in unprece-

mented data-rich environments in smart manufacturing systems, which brings significant challenges and great opportunities for quality improvements in smart manufacturing systems. With massive data readily available and manufacturing domain knowledge, it is desired to develop new computational methodologies for quality improvement that will realize process monitoring, prognostics, diagnosis, control, and intelligent decision making. This presentation will discuss research opportunities, challenges, and advancements in knowledge-infused sparse learning for quality improvement in smart manufacturing systems. Emphasis is given on the recent publications on (i) optimal shape control strategy for compliant part assembly via sparse learning and (ii) ranking features to promote diversity for fault diagnosis in manufacturing systems. Real case studies will be used to illustrate the developed new methodologies.

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2021EMNLP

nlp  
NLP

Remote Sensing  
home lab

Ubicomp workshop

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Environmental Change, Journal of Cleaner Production, Journal of Environmental Management, Renewable Energy

One Earth, Global

2018

William Nordhaus

## Social media information sharing for natural disaster response

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tenure-track

CMMI Panel Fellow  
Early Career Award

NSF CISE CRII Award

IISE  
Communication Engineering

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INFORMS 2020  
Sustainable Futures

Social media has become an essential channel for post ng disaster-related information, which provides governments and relief agencies real-t me data for bet er disaster management. However, research in this f eld has not received suf cient at ent on, and extract ng useful information is st ll challenging. The work will be presented aims to improve disaster relief ef ciency via mining and analyzing social media data like public at tudes toward disaster response and public demands for targeted relief supplies during dif erent types of disasters using machine learning models. The change of public opinion during dif erent natural disasters and the evolut on of peoples' behavior of using social media for disaster relief in the face of the ident cal type of natural disasters as Twitter continues to evolve are also studied. The research results demonstrate the feasibility and validation of the proposed research approach and provide relief agencies with insights into bet er disaster management.

# The remote sensing image percept on cognit on framework for the large-scale disasters: algorithms and applications

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The percept on-cognit on framework focus on regional/global disaster (climate change, floods, earthquakes) assessment and early warning. Compared with the current remote sensing image processing methods based on machine learning, the biggest difference of our proposed percept on-cognit on framework is that the dynamic properties of disaster are considered and an end-to-end mapping and fusion of percept on and cognit ve data is realized. Specifically, it consists of three main parts: 1) Where is the scene target/change target in remote sensing images? (Percept on: Where), 2) How to dig deeper into the spatial and temporal geographic information of the target? (Cognit on: with whom), and 3) How to realize the refined management and fusion of these information (percept on and cognit on)? (act ve cognit on: where to go).

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Remote Sensing

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Computer Methods and Programs in Biomedicine

(Electronic Health Records, EHRs)  
EHRs

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**abess**

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Proceedings of the National Academy of Sciences Journal of the American  
Statistical Association Journal of Statistical Software  
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<https://github.com/abess-team/abess>

**Self-Organized Hawkes Processes**



We propose a novel self-organized Hawkes process (SOHP) to model complex event sequences based on extremely few observations. Motivated by the fact that the complicated global relations among events are often composed of simple local relations, we model the event sequences by a set of heterogeneous local Hawkes processes rather than a single Hawkes process. In the training phase, we learn the Hawkes processes with a self-organization mechanism, selecting training sequences adaptively for each Hawkes process by a bandit algorithm. The reward used in the algorithm is originally defined based on an optimal transport distance. Additionally, we leverage the superposition property of the Hawkes process to enhance the robustness of our algorithm to the data sparsity problem. We apply our SOHP method to sequential recommendation problems in the continuous-time domain and achieve encouraging performance in various datasets.

## High-Dimensional Instrumental Variables Additive Model



Instrumental Variables Regression (IVR) is a fundamental tool for handling unmeasured confoundedness in causal inference. If measurements of multiple covariates  $X$  and the response  $Y$  are confounded by some unobserved variables, the causal effect cannot be identified due to confounding bias. If an instrumental variable  $Z$  is available, which satisfies the following: (1) it influences  $X$  directly; (2) it is conditionally independent of  $Y$  given  $X$ ; and (3) it is independent of the unmeasured confounders, the causal effect can be identified. The classic two-stage least squares algorithm simplifies the estimation problem by first regressing the endogenous variables on the instrumental variables and then regressing the response variable on the fitted values obtained from the first stage. In this paper, we consider a flexible two-stage instrumental variables regression for high-dimensional data. Our model allows for non-linear relationship between the instrumental variables and the covariates, and allows data in both stages to be high-dimensional. We provide non-asymptotic analysis for the estimation errors of the parameters of interest. Moreover, we employ a debiased procedure to establish valid inference for the parameters using the framework in *Confidence intervals and hypothesis testing for high-dimensional regression*. Extensive numerical experiments show that our method yields consistent estimation and has more flexibility than existing methods in the literature. We also apply our method to a real-world dataset and obtain intriguing results about the genetic effects on mouse obesity.

## Distributed Community Detection for Large Scale Networks Using Stochastic Block Model



With rapid developments of information and technology, large scale network data are ubiquitous. In this work we develop a distributed spectral clustering algorithm for community detection in large scale networks. To handle the problem, we distribute  $l$  pilot network nodes on the master server and the others on worker servers. A spectral clustering algorithm is first conducted on the master to select pseudo centers. The indexes of the pseudo centers are then broadcasted to workers to complete distributed community detection task using a SVD type algorithm. The proposed distributed algorithm has three merits. First, the communication cost is low since only the indexes of pseudo centers are communicated. Second, no further iteration algorithm is needed on workers and hence it does not suffer from problems as initialization and non-robustness. Third, both the computational complexity and the storage requirements are much lower compared to using the whole adjacency matrix.



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## 会议主办方：



中国人民大学应用统计科学研究中心  
Center for Applied Statistics of Renmin University of China



## 会议承办方：

中国人民大学数据科学与大数据统计系

## 赞助商：

