IT 497 Lab9

# Step 4: Replicate your Dynamic Query Tool from above query using R

# b. Load the needed packages  
library(httr)

## Warning: package 'httr' was built under R version 4.0.3

library(jsonlite)

## Warning: package 'jsonlite' was built under R version 4.0.3

# 1. affiliation= Illinois State University  
# author=Tang  
# c. Use the results query to recreate your request  
  
url1 <- "http://ieeexploreapi.ieee.org/api/v1/search/articles?"  
key1 <- "apikey=ycjb34xarj885mhkfx2qg38r"  
format1 <- "&format=json&max\_records=25&start\_record=1&sort\_order=asc&sort\_field=article\_number"  
search.terms1 <- "&affiliation=Illinois+State+University&author=Tang"

# we will use the paste0 package to pull everything into a single string  
z1 <- paste0(url1,key1,format1,search.terms1)

# we will now use the httr package GET function to connect to the IEEE API  
# GET is upper case - R is case sensitive  
y1 <- GET(z1)  
get\_text1 <- content(y1, "text")

# check the output to see that we obtained data  
get\_text1

## [1] "{\"total\_records\":29,\"total\_searched\":5325232,\"articles\":[{\"doi\":\"10.1109/DSN.2009.5270328\",\"title\":\"Sharing end-user negative symptoms for improving overlay network dependability\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4244-4421-2\",\"issn\":\"2158-3927\",\"partnum\":\"09CH38143\",\"rank\":1,\"authors\":{\"authors\":[{\"affiliation\":\"School of Information Technology, Illinois State University, Normal 61790, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":1},{\"affiliation\":\"School of Computing, DePaul University, Chicago IL 60604, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38274081300\",\"id\":38274081300,\"full\_name\":\"Ehab Al-Shaer\",\"author\_order\":2}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"The dependability of overlay services rely on the overlay network's capabilities to effectively diagnose and recover faults (e.g., link failures, overlay node outages). However, overlay applications bring to overlay fault diagnosis new challenges, which include large-scale deployment, inaccessible underlying network information, dynamic symptom-fault causality relationship, and multi-layer complexity. In this paper, we develop an evidential overlay fault diagnosis framework (called DigOver) to tackle these challenges. Firstly, the DigOver identifies a set of potential faulty components based on shared end-user observed negative symptoms. Then, each potential faulty component is evaluated to quantify its fault likelihood and the corresponding evaluation uncertainty. Finally, the DigOver dynamically constructs a plausible fault graph to locate the root causes of end-user observed negative symptoms.\",\"article\_number\":\"5270328\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5270328\",\"html\_url\":\"https://ieeexplore.ieee.org/document/5270328/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/5270328/\",\"publication\_title\":\"2009 IEEE/IFIP International Conference on Dependable Systems & Networks\",\"conference\_location\":\"Lisbon\",\"conference\_dates\":\"29 June-2 July 2009\",\"publication\_number\":5243642,\"is\_number\":5270274,\"publication\_year\":2009,\"publication\_date\":\"29 June-2 July 2009\",\"start\_page\":\"275\",\"end\_page\":\"284\",\"citing\_paper\_count\":5,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Fault diagnosis\",\"Uncertainty\",\"Monitoring\",\"Information technology\",\"Computer networks\",\"Large-scale systems\",\"Resource virtualization\",\"Bandwidth\",\"Scalability\",\"Statistics\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"CD\",\"value\":\"978-1-4244-4421-2\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4244-4422-9\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/ICNP.2009.5339672\",\"title\":\"RASPberry: A stable reader activation scheduling protocol in multi-reader RFID systems\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4244-4634-6\",\"issn\":\"1092-1648\",\"partnum\":\"09EX2953\",\"rank\":2,\"authors\":{\"authors\":[{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37305070700\",\"id\":37305070700,\"full\_name\":\"ShaoJie Tang\",\"author\_order\":1},{\"affiliation\":\"State Key Lab of Novel Software Technology, Nanjing University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37540064800\",\"id\":37540064800,\"full\_name\":\"Jing Yuan\",\"author\_order\":2},{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086211554\",\"id\":37086211554,\"full\_name\":\"Xiang-Yang Li\",\"author\_order\":3},{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37277944700\",\"id\":37277944700,\"full\_name\":\"Guihai Chen\",\"author\_order\":4},{\"affiliation\":\"Department of Computer Science and Engineering, HKUST, Hongkong, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086767873\",\"id\":37086767873,\"full\_name\":\"Yunhao Liu\",\"author\_order\":5},{\"affiliation\":\"Department of Computer Science, Xi'An JiaoTong University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38247845800\",\"id\":38247845800,\"full\_name\":\"JiZhong Zhao\",\"author\_order\":6}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Recent technological advances have motivated large-scale deployment of RFID systems. RFID readers are often static and carefully deployed in a planned manner. However, the distribution and movements of tags are often dynamically changed and unpredictable. We study a challenging problem of scheduling the activation of the readers without collision such that the system can work in a stable way in the long term. Here a schedule is stable if at any time slot, the number of total unread tags is bounded from above with high probability under this scheduling. In this paper, we propose a stable reader activation scheduling protocol, RASPberry, in multi-reader RFID systems. We analytically prove that our scheduling protocol, RASPberry, is stable if the arrival rate of tags is less than the processing rate of all readers. In RASPberry, at any time slot, a reader can determine its status using only information of readers within a local neighborhood. To the best of our knowledge, this is the first work to address the stability problem of reader activation scheduling in RFID systems. Our extensive simulations show that our system performs very well.\",\"article\_number\":\"5339672\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5339672\",\"html\_url\":\"https://ieeexplore.ieee.org/document/5339672/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/5339672/\",\"publication\_title\":\"2009 17th IEEE International Conference on Network Protocols\",\"conference\_location\":\"Princeton, NJ\",\"conference\_dates\":\"13-16 Oct. 2009\",\"publication\_number\":5335585,\"is\_number\":5339659,\"publication\_year\":2009,\"publication\_date\":\"13-16 Oct. 2009\",\"start\_page\":\"304\",\"end\_page\":\"313\",\"citing\_paper\_count\":20,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Radiofrequency identification\",\"Stability\",\"Throughput\",\"Computer science\",\"Processor scheduling\",\"Dynamic scheduling\",\"Scheduling algorithm\",\"Access protocols\",\"Security\"]},\"author\_terms\":{\"terms\":[\"RFID\",\"reader\",\"scheduling\",\"stability\",\"graph\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"CD\",\"value\":\"978-1-4244-4634-6\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4244-4635-3\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/TED.2010.2044294\",\"title\":\"Parameter Extraction of Short-Channel a-Si:H TFT Including Self-Heating Effect and Drain Current Nonsaturation\",\"publisher\":\"IEEE\",\"issue\":\"5\",\"issn\":\"1557-9646\",\"rank\":3,\"volume\":\"57\",\"authors\":{\"authors\":[{\"affiliation\":\"Department of Electrical Engineering, University at Buffalo, State University of New York (SUNY), Buffalo, NY, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37401771400\",\"id\":37401771400,\"full\_name\":\"Zhao Tang\",\"author\_order\":1},{\"affiliation\":\"LCD R&D Center , Samsung Electronics Co., LTD, Yongin City, Korea\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38183447700\",\"id\":38183447700,\"full\_name\":\"Mun-Soo Park\",\"author\_order\":2},{\"affiliation\":\"University of Illinois at Urbana-Champaign, Urbana, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37402485200\",\"id\":37402485200,\"full\_name\":\"Sung Hun Jin\",\"author\_order\":3},{\"affiliation\":\"Department of Electrical Engineering, University at Buffalo, State University of New York (SUNY), Buffalo, NY, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37303313900\",\"id\":37303313900,\"full\_name\":\"Chu Ryang Wie\",\"author\_order\":4}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Journals\",\"abstract\":\"We present an extraction procedure of the above-threshold parameters of a modified level-15 model of hydrogenated amorphous-silicon thin-film transistors (a-Si:H TFTs). This procedure is useful for model parameter extraction for short-channel devices, including the self-heating effect (SHE) and the nonsaturating drain current effect via the channel length modulation (CLM). The drain current formula of the AIM-Spice level-15 model was modified to include the nonsaturating drain current and SHE in the model. This procedure is also useful for devices in which the source-drain contact resistance Rsd is comparable to, or greater than, the channel resistance, which is common in short-channel a-Si:H TFTs with a channel length of 10 ?m or less. We propose a modified integral function method for the extraction of contact resistance and threshold voltage. This method includes features of the ratio method and the integral function method. Using this modified integral function method, we extract both the threshold voltage Vt and the series contact resistance Rsd at the very beginning of the extraction process. When simulated data were used for extraction, Vt and Rsd extracted by our proposed method agreed with the true parameter values better than the parameters extracted by the integral function method or the ratio method. For a short-channel device with a significant SHE, the field-effect mobility ? FE parameters were separately extracted for the linear and saturation regions, because ?FE was higher in the saturation region than that in the linear region, which is probably caused by the SHE-induced rise of channel temperature. The calculated I-V characteristics based on the extracted parameters fit the experimental data well in both the short- and long-channel devices. This suggests that the modified drain current model including the SHE and the nonsaturating drain current is valid; the proposed parameter extraction procedure is valid and may be implemented in the circuit simulator, such as AIM-SPICE, with some further improvement in the field-effect mobility formula when SHE is present.\",\"article\_number\":\"5440919\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5440919\",\"html\_url\":\"https://ieeexplore.ieee.org/document/5440919/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/5440919/\",\"publication\_title\":\"IEEE Transactions on Electron Devices\",\"publication\_number\":16,\"is\_number\":5452102,\"publication\_year\":2010,\"publication\_date\":\"May 2010\",\"start\_page\":\"1093\",\"end\_page\":\"1101\",\"citing\_paper\_count\":10,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Iron\",\"Data mining\",\"Thin film transistors\",\"Parameter extraction\",\"Logic gates\",\"Temperature\",\"Integrated circuit modeling\"]},\"author\_terms\":{\"terms\":[\"Hydrogenated amorphous-silicon thin-film transistors (a-Si:H TFT)\",\"nonsaturating drain current\",\"parameter extraction\",\"self-heating\"]}}},{\"doi\":\"10.1109/IWQoS.2010.5542759\",\"title\":\"DREAM: On the reaction delay in large scale wireless networks with mobile sensors\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4244-5988-9\",\"issn\":\"1548-615X\",\"partnum\":\"10EX4195\",\"rank\":4,\"authors\":{\"authors\":[{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, IL, 60616\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37305070700\",\"id\":37305070700,\"full\_name\":\"ShaoJie Tang\",\"author\_order\":1},{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, IL, 60616\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37280866600\",\"id\":37280866600,\"full\_name\":\"Xiang-Yang Li\",\"author\_order\":2},{\"affiliation\":\"State Key Laboratory of Novel Software Technology, NanJing University, NanJing, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37540064800\",\"id\":37540064800,\"full\_name\":\"Jing Yuan\",\"author\_order\":3},{\"affiliation\":\"Department of Computer Science, Tongji University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37310514000\",\"id\":37310514000,\"full\_name\":\"Cheng Wang\",\"author\_order\":4},{\"affiliation\":\"State Key Laboratory of Novel Software Technology, NanJing University, NanJing, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37277944700\",\"id\":37277944700,\"full\_name\":\"GuiHai Chen\",\"author\_order\":5},{\"affiliation\":\"Department of Computer Science, Tongji University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37272618800\",\"id\":37272618800,\"full\_name\":\"Changjun Jiang\",\"author\_order\":6}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"In this work, we present a monitor and rescue system utilizing hybrid networks which is a integration of stationary sensor networks and mobile sensor networks: stationary sensor networks comprised of large numbers of small, simple, and inexpensive wireless sensors, and the mobile sensor network contains a set of mobile sensors (robots). The static sensors in our network have “monitoring” ability, i.e., any activated static sensor can detect the event as long as its sensing range intersects the event region. And the mobile sensors have “moving” and “rescuing” ability, e.g., they can move toward the event region with limited speed and further perform certain rescuing/processing operations on the event. We can consider the event as a hazard, e.g., wild fire, and the mobile sensors as fireman robots. As soon as the fire is detected by the static sensors, the fireman robots are expected to move from its initial location to the hazard region within minimum latency. We define the reaction delay of the system as the delay from the occurrence of event till at least one mobile sensor reaches the event. In order to satisfy certain reaction delay requirement while minimizing the total cost, we propose a number of deployment strategies for the stationary sensor network and mobile sensor network respectively. We further design a random wake-up scheduling for the static sensors for the sake of energy efficiency. Finally, we propose a pure distributed motion strategy for mobile sensors without reliance on localization services such as GPS, focusing on simple algorithms for distributed decision making and information propagation. We demonstrate the efficacy of our system in simulation, providing empirical results.\",\"article\_number\":\"5542759\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5542759\",\"html\_url\":\"https://ieeexplore.ieee.org/document/5542759/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/5542759/\",\"publication\_title\":\"2010 IEEE 18th International Workshop on Quality of Service (IWQoS)\",\"conference\_location\":\"Beijing\",\"conference\_dates\":\"16-18 June 2010\",\"publication\_number\":5529963,\"is\_number\":5542702,\"publication\_year\":2010,\"publication\_date\":\"16-18 June 2010\",\"start\_page\":\"1\",\"end\_page\":\"9\",\"citing\_paper\_count\":0,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Wireless sensor networks\",\"Large-scale systems\",\"Sensor systems\",\"Robot sensing systems\",\"Mobile robots\",\"Hazards\",\"Fires\",\"Delay systems\",\"Monitoring\",\"Event detection\"]},\"author\_terms\":{\"terms\":[\"Sensor networks\",\"mobility\",\"detection\",\"delay\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"CD\",\"value\":\"978-1-4244-5988-9\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4244-5987-2\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4244-5986-5\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/IWQoS.2010.5542765\",\"title\":\"DAWN: Energy efficient data aggregation in WSN with mobile sinks\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4244-5988-9\",\"issn\":\"1548-615X\",\"partnum\":\"10EX4195\",\"rank\":5,\"authors\":{\"authors\":[{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37305070700\",\"id\":37305070700,\"full\_name\":\"ShaoJie Tang\",\"author\_order\":1},{\"affiliation\":\"State Key Laboratory of Novel Software Technology, NanJing University, NanJing, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37540064800\",\"id\":37540064800,\"full\_name\":\"Jing Yuan\",\"author\_order\":2},{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37280866600\",\"id\":37280866600,\"full\_name\":\"XiangYang Li\",\"author\_order\":3},{\"affiliation\":\"Department of Computer Science and Engineering, HKUST, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37279413400\",\"id\":37279413400,\"full\_name\":\"Yunhao Liu\",\"author\_order\":4},{\"affiliation\":\"State Key Laboratory of Novel Software Technology, NanJing University, NanJing, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37277944700\",\"id\":37277944700,\"full\_name\":\"GuiHai Chen\",\"author\_order\":5},{\"affiliation\":\"Key Laboratory of Information System Security, Tsinghua University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37400401800\",\"id\":37400401800,\"full\_name\":\"Ming Gu\",\"author\_order\":6},{\"affiliation\":\"Department of Computer Science and Engineering Xi'An JiaoTong University\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37310097900\",\"id\":37310097900,\"full\_name\":\"JiZhong Zhao\",\"author\_order\":7},{\"affiliation\":\"Institute of Computer Application Technology, Hangzhou Dianzi University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37400277600\",\"id\":37400277600,\"full\_name\":\"Guojun Dai\",\"author\_order\":8}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"The benefits of using mobile sink to prolong sensor network lifetime have been well recognized. However, few provably theoretical results remain are developed due to the complexity caused by time-dependent network topology. In this work, we investigate the optimum routing strategy for the static sensor network. We further propose a number of motion stratifies for the mobile sink(s) to gather real time data from static sensor network, with the objective to maximize the network lifetime. Specially, we consider a more realistic model where the moving speed and path for mobile sinks are constrained. Our extensive experiments show that our scheme can significantly prolong entire network lifetime and reduce delivery delay.\",\"article\_number\":\"5542765\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5542765\",\"html\_url\":\"https://ieeexplore.ieee.org/document/5542765/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/5542765/\",\"publication\_title\":\"2010 IEEE 18th International Workshop on Quality of Service (IWQoS)\",\"conference\_location\":\"Beijing\",\"conference\_dates\":\"16-18 June 2010\",\"publication\_number\":5529963,\"is\_number\":5542702,\"publication\_year\":2010,\"publication\_date\":\"16-18 June 2010\",\"start\_page\":\"1\",\"end\_page\":\"9\",\"citing\_paper\_count\":18,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Energy efficiency\",\"Wireless sensor networks\",\"Routing\",\"Computer science\",\"Optical sensors\",\"Temperature sensors\",\"Laboratories\",\"Data engineering\",\"Power engineering and energy\",\"Network topology\"]},\"author\_terms\":{\"terms\":[\"Sensor networks\",\"mobility\",\"detection\",\"delay\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"CD\",\"value\":\"978-1-4244-5988-9\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4244-5987-2\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4244-5986-5\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/JSEN.2010.2060479\",\"title\":\"Virtual Ion Selective Electrode for Online Measurement of Nutrient Solution Components\",\"publisher\":\"IEEE\",\"issue\":\"2\",\"issn\":\"2379-9153\",\"rank\":6,\"volume\":\"11\",\"authors\":{\"authors\":[{\"affiliation\":\"Department of Automation, University of Science and Technology of China, Hefei, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38560151000\",\"id\":38560151000,\"full\_name\":\"Feng Chen\",\"author\_order\":1},{\"affiliation\":\"Department of Automation, University of Science and Technology of China, Hefei, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37530104200\",\"id\":37530104200,\"full\_name\":\"Dali Wei\",\"author\_order\":2},{\"affiliation\":\"School of Information Technology, Illinois State University, Normal, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":3}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Journals\",\"abstract\":\"The measurement of multiple components in nutrient solution is prerequisite for optimal control of nutrient solution. The current measurement methods of nutrient solution estimate the concentrations of components in nutrient solution based on pH and electronic conductivity (EC) values, which lead to large errors. In this paper, a virtual ion selective electrode (VISE) approach is proposed to online measure the hard-to-measure components in nutrient solution with highly improved performance (e.g., accuracy and speed). In order to effectively model VISE, the correlation among nutrient solution components has to be analyzed, which is significantly challenging due to its uncertainty and complexity. In this study, the variation regularities of the nutrient solution components are experimentally investigated. The correlation among the nutrient solution components is found according to the intrinsic analysis of vegetable growth. In our approach, least squares support vector machine (LS-SVM) is adopted to fuse the sensor data to achieve fast computing and global optimum. In addition, to improve the estimation accuracy and reduce the computational complexity of LS-SVM, a formula is introduced based on the characteristics of ion selective electrode (ISE) to represent the regularization parameter, which is critical in determining the tradeoff between the model complexity and fitting errors. The experimental results show that the proposed VISE model is effective and offers a beneficial reference for multiple component measurement.\",\"article\_number\":\"5582134\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5582134\",\"html\_url\":\"https://ieeexplore.ieee.org/document/5582134/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/5582134/\",\"publication\_title\":\"IEEE Sensors Journal\",\"publication\_number\":7361,\"is\_number\":5638351,\"publication\_year\":2011,\"publication\_date\":\"Feb. 2011\",\"start\_page\":\"462\",\"end\_page\":\"468\",\"citing\_paper\_count\":6,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Mathematical model\",\"Support vector machines\",\"Correlation\",\"Electrodes\",\"Equations\",\"Artificial neural networks\",\"Estimation\"]},\"author\_terms\":{\"terms\":[\"Least squares support vector machine (LS-SVM)\",\"multiple components\",\"nutrient solution\",\"virtual ion selective electrode (VISE)\"]}}},{\"doi\":\"10.1109/BICTA.2010.5645219\",\"title\":\"Wavelet analysis based sparse LS-SVR for time series data\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4244-6439-5\",\"partnum\":\"10EX4268\",\"rank\":7,\"authors\":{\"authors\":[{\"affiliation\":\"Department of Automation, University of Science and Technology of China, Hefei, 230027, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38560151000\",\"id\":38560151000,\"full\_name\":\"Feng Chen\",\"author\_order\":1},{\"affiliation\":\"Department of Automation, University of Science and Technology of China, Hefei, 230027, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37530104200\",\"id\":37530104200,\"full\_name\":\"Dali Wei\",\"author\_order\":2},{\"affiliation\":\"School of Information Technology, Illinois State University, Normal 61790, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":3}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Due to the performances of low computational cost and excellent generalization capability, Least squares support vector regression (LS-SVR) has been successfully applied to function estimation and forecasting problems. However, in comparison to SVR, LS-SVR loses the sparseness and has worse robustness for large training samples. In this paper, a sparse LS-SVR is proposed for the regression of large time series data. The signal features are extracted by using the multi-scale decomposition and wavelet denoising for training sample set. Based on the reconstructed signal, the importance of training samples is determined and the sparseness is imposed to LS-SVR. The typical benchmark functions are employed to evaluate our proposed algorithm. The experimental results show this algorithm can not only reduce the number of training samples significantly, but also eliminate noise interference.\",\"article\_number\":\"5645219\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5645219\",\"html\_url\":\"https://ieeexplore.ieee.org/document/5645219/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/5645219/\",\"publication\_title\":\"2010 IEEE Fifth International Conference on Bio-Inspired Computing: Theories and Applications (BIC-TA)\",\"conference\_location\":\"Changsha\",\"conference\_dates\":\"23-26 Sept. 2010\",\"publication\_number\":5629467,\"is\_number\":5645057,\"publication\_year\":2010,\"publication\_date\":\"23-26 Sept. 2010\",\"start\_page\":\"750\",\"end\_page\":\"755\",\"citing\_paper\_count\":0,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Noise\",\"Robustness\"]},\"author\_terms\":{\"terms\":[\"wavelet analysis\",\"least squares support vector regression\",\"wavelet denoising\",\"sparseness\",\"time series data\",\"soft thresholding\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"CD\",\"value\":\"978-1-4244-6439-5\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4244-6437-1\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4244-6440-1\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/SAHCN.2011.5984930\",\"title\":\"A real-time rescue system: Towards practical implementation of robotic sensor network\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4577-0092-7\",\"issn\":\"2155-5486\",\"partnum\":\"11EX5374\",\"rank\":8,\"authors\":{\"authors\":[{\"affiliation\":\"State Key Laboratory for Novel Software Technology, Nanjing University, Nanjing, P.R. China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37540064800\",\"id\":37540064800,\"full\_name\":\"Jing Yuan\",\"author\_order\":1},{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, IL, 60616\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37305070700\",\"id\":37305070700,\"full\_name\":\"Shao-Jie Tang\",\"author\_order\":2},{\"affiliation\":\"Department of Computer Science, Tongji University, Shanghai, P.R. 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China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37277944700\",\"id\":37277944700,\"full\_name\":\"Guihai Chen\",\"author\_order\":7}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"A real-time monitor and rescue system must be able to both quickly and reliably detect the event happening in its monitoring region. Furthermore, it is required to fulfill certain rescue mission, e.g., navigate victims to exit through safe path in case of emergency. Current monitor and rescue approaches generally rely on either teleoperated robots, or teams of wireless robots. Typically the robots used in these systems tend to have high cost which make them unpractical in large scale deployment and applications. In this work, we present a realtime monitor and rescue system, TelosW-Bot Net, utilizing integrated networks. The integrated network is an integration of stationary sensor networks and robots: static sensor networks comprised of large numbers of small, simple, and inexpensive wireless sensors, and the robots which can communicate and controlled by sensor nodes. We demonstrate the efficacy of our system in real test bed composed of 46 sensors, which is one of the largest robotic sensor network to our knowledge, providing empirical results.\",\"article\_number\":\"5984930\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5984930\",\"html\_url\":\"https://ieeexplore.ieee.org/document/5984930/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/5984930/\",\"publication\_title\":\"2011 8th Annual IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks\",\"conference\_location\":\"Salt Lake City, UT\",\"conference\_dates\":\"27-30 June 2011\",\"publication\_number\":5970760,\"is\_number\":5984877,\"publication\_year\":2011,\"publication\_date\":\"27-30 June 2011\",\"start\_page\":\"458\",\"end\_page\":\"466\",\"citing\_paper\_count\":3,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Robot sensing systems\",\"Navigation\",\"Monitoring\",\"Hardware\",\"Accuracy\"]},\"author\_terms\":{\"terms\":[\"wireless network\",\"sensor network\",\"robot\",\"platform\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"CD\",\"value\":\"978-1-4577-0092-7\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4577-0094-1\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4577-0093-4\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/ICACC.2011.6016443\",\"title\":\"In-situ optimal control of nutrient solution for soilless cultivation\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4244-8809-4\",\"partnum\":\"11EX4819\",\"rank\":9,\"authors\":{\"authors\":[{\"affiliation\":\"Department of Automation, University of Science and Technology of China, Hefei, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38560151000\",\"id\":38560151000,\"full\_name\":\"Feng Chen\",\"author\_order\":1},{\"affiliation\":\"Department of Automation, University of Science and Technology of China, Hefei, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37897967600\",\"id\":37897967600,\"full\_name\":\"Haidong He\",\"author\_order\":2},{\"affiliation\":\"School of Information Technology, Illinois State University, Chicago, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":3}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Soilless cultivation is one of main production modes in precision agriculture. Nutrient solution for soilless cultivation primarily consists of macroelements such as NO3-, H2PO4-, K+, Ca2+, Mg2+, and SO42-. In vegetable-nutrient solution system, there are complicated correlations between greenhouse vegetable growth and nutrient solution, thus it is a challenge to achieve optimal control of nutrient solution. In this work, based on Q-learning, we first propose an in-situ optimal control method of nutrient solution compositions for greenhouse vegetable. Instead of modeling the correlations between greenhouse vegetable growth and nutrient solution, this method searches for optimal control policy through systematic interaction with the environment. The effect of nutrient solution compositions on photosynthetic rate of greenhouse vegetable is experimentally investigated, and on this basis reward function is designed. The experimental results show our method is effective and practical.\",\"article\_number\":\"6016443\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6016443\",\"html\_url\":\"https://ieeexplore.ieee.org/document/6016443/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/6016443/\",\"publication\_title\":\"2011 3rd International Conference on Advanced Computer Control\",\"conference\_location\":\"Harbin\",\"conference\_dates\":\"18-20 Jan. 2011\",\"publication\_number\":5993576,\"is\_number\":6016352,\"publication\_year\":2011,\"publication\_date\":\"18-20 Jan. 2011\",\"start\_page\":\"412\",\"end\_page\":\"416\",\"citing\_paper\_count\":0,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Green products\",\"Soil measurements\"]},\"author\_terms\":{\"terms\":[\"nutrient solution\",\"in-suit\",\"optimal control\",\"Qlearning\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Print ISBN\",\"value\":\"978-1-4244-8809-4\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4244-8810-0\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/ICNC.2011.6022365\",\"title\":\"Tradeoff strategy between exploration and exploitation for PSO\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4244-9952-6\",\"issn\":\"2157-9555\",\"partnum\":\"11EX5118\",\"rank\":10,\"volume\":\"3\",\"authors\":{\"authors\":[{\"affiliation\":\"Department of Automation, University of Science and Technology of China, HeFei, 230027, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38560151000\",\"id\":38560151000,\"full\_name\":\"Feng Chen\",\"author\_order\":1},{\"affiliation\":\"Department of Automation, University of Science and Technology of China, HeFei, 230027, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37534897700\",\"id\":37534897700,\"full\_name\":\"Xinxin Sun\",\"author\_order\":2},{\"affiliation\":\"Department of Automation, University of Science and Technology of China, HeFei, 230027, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38235912900\",\"id\":38235912900,\"full\_name\":\"Dali Wei\",\"author\_order\":3},{\"affiliation\":\"School of Information Technology, Illinois State University, Normal 61790, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":4}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Particle Swarm Optimization (PSO) is a class of stochastic search algorithms based on population. Due to the simplicity of implementation and promising optimization capability, PSO is successfully applied to solving a wide class of scientific and engineering optimization problems. However, PSO has some drawbacks such as high computational complexity and premature convergence. Inspired by the tradeoff strategy between exploration and exploitation in reinforcement learning, we propose an improved PSO. The sigmoid function is incorporated into the velocity update equation of PSO to tackle these drawbacks of PSO. The comparison with inertia weight PSO, constriction factor PSO and Tribe PSO using classic benchmark functions demonstrates that our approach achieves a good tradeoff between exploration and exploitation, and thus obtain better global optimization result and faster convergence speed.\",\"article\_number\":\"6022365\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6022365\",\"html\_url\":\"https://ieeexplore.ieee.org/document/6022365/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/6022365/\",\"publication\_title\":\"2011 Seventh International Conference on Natural Computation\",\"conference\_location\":\"Shanghai\",\"conference\_dates\":\"26-28 July 2011\",\"publication\_number\":6012803,\"is\_number\":6022259,\"publication\_year\":2011,\"publication\_date\":\"26-28 July 2011\",\"start\_page\":\"1216\",\"end\_page\":\"1222\",\"citing\_paper\_count\":14,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Optimization\",\"Convergence\",\"Benchmark testing\",\"Equations\",\"Mathematical model\",\"Learning\",\"Acceleration\"]},\"author\_terms\":{\"terms\":[\"particle swarm optimization\",\"exploration\",\"exploitation\",\"tradeoff\",\"reinforcement learning\",\"sigmoid Function\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"CD\",\"value\":\"978-1-4244-9952-6\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4244-9950-2\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4244-9953-3\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/TNSM.2011.010312.110126\",\"title\":\"Reasoning under Uncertainty for Overlay Fault Diagnosis\",\"publisher\":\"IEEE\",\"issue\":\"1\",\"issn\":\"2373-7379\",\"rank\":11,\"volume\":\"9\",\"authors\":{\"authors\":[{\"affiliation\":\"School of Information Technology, Illinois State University\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":1},{\"affiliation\":\"Department of Software and Information Systems, University of North Carolina at Charlotte\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38274081300\",\"id\":38274081300,\"full\_name\":\"Ehab Al-Shaer\",\"author\_order\":2},{\"affiliation\":\"AT&T Research Labs\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37267824700\",\"id\":37267824700,\"full\_name\":\"Kaustubh Joshi\",\"author\_order\":3}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Journals\",\"abstract\":\"The performance and reliability of overlay services rely on the underlying overlay network's ability to effectively diagnose and recover from faults such as link failures and overlay node outages. However, overlay networks bring to fault diagnosis new challenges such as large-scale deployment, inaccessible underlay network information, dynamic symptom-fault causality relationship, and multi-layer complexity. In this paper, we develop an evidential overlay fault diagnosis framework called DigOver to tackle these challenges. Firstly, DigOver identifies a set of potential faulty components based on shared end-user observed negative symptoms. Then, each potential faulty component is evaluated to quantify its fault likelihood and the corresponding evaluation uncertainty. Finally, DigOver dynamically constructs a plausible fault graph to locate the root causes of end-user observed negative symptoms. Both simulation and Internet experiments demonstrate that DigOver can effectively and accurately diagnose overlay faults based on end-user observed negative symptoms.\",\"article\_number\":\"6122518\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6122518\",\"html\_url\":\"https://ieeexplore.ieee.org/document/6122518/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/6122518/\",\"publication\_title\":\"IEEE Transactions on Network and Service Management\",\"publication\_number\":4275028,\"is\_number\":6161590,\"publication\_year\":2012,\"publication\_date\":\"March 2012\",\"start\_page\":\"34\",\"end\_page\":\"47\",\"citing\_paper\_count\":9,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Uncertainty\",\"Fault diagnosis\",\"Cognition\",\"Knowledge engineering\",\"Monitoring\",\"Network topology\",\"Correlation\"]},\"author\_terms\":{\"terms\":[\"Overlay networks\",\"uncertainty reasoning\",\"fault diagnosis\",\"dependable networks\"]}}},{\"doi\":\"10.1109/INFCOM.2012.6195616\",\"title\":\"Almost optimal accessing of nonstochastic channels in cognitive radio networks\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4673-0774-1\",\"issn\":\"0743-166X\",\"partnum\":\"12CH38951\",\"rank\":12,\"authors\":{\"authors\":[{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37280866600\",\"id\":37280866600,\"full\_name\":\"Xiang-Yang Li\",\"author\_order\":1},{\"affiliation\":\"Institute of Communications Engineering, PLA University of Science and Technology, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37400936800\",\"id\":37400936800,\"full\_name\":\"PanLong Yang\",\"author\_order\":2},{\"affiliation\":\"Institute of Command Automation, PLA University of Science and Technology, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37593090600\",\"id\":37593090600,\"full\_name\":\"Yubo Yan\",\"author\_order\":3},{\"affiliation\":\"State Key Laboratory for Novel Software Technology, NanJing University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37863875500\",\"id\":37863875500,\"full\_name\":\"LiZhao You\",\"author\_order\":4},{\"affiliation\":\"Department of Computer Science, Illinois Institute of Technology, Chicago, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37305070700\",\"id\":37305070700,\"full\_name\":\"Shaojie Tang\",\"author\_order\":5},{\"affiliation\":\"Department of Electrical and Computer Engineering, University of Florida, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38244323200\",\"id\":38244323200,\"full\_name\":\"QiuYuan Huang\",\"author\_order\":6}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"We propose joint channel sensing, probing, and accessing schemes for secondary users in cognitive radio networks. Our method has time and space complexity O(N·k) for a network with N channels and k secondary users, while applying classic methods requires exponential time complexity. We prove that, even when channel states are selected by adversary (thus non-stochastic), it results in a total regret uniformly upper bounded by T(vTN log N), w.h.p, for communication lasts for T timeslots. Our protocol can be implemented in a distributed manner due to the nonstochastic channel assumption. Our experiments show that our schemes achieve almost optimal throughput compared with an optimal static strategy, and perform significantly better than previous methods in many settings.\",\"article\_number\":\"6195616\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6195616\",\"html\_url\":\"https://ieeexplore.ieee.org/document/6195616/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/6195616/\",\"publication\_title\":\"2012 Proceedings IEEE INFOCOM\",\"conference\_location\":\"Orlando, FL\",\"conference\_dates\":\"25-30 March 2012\",\"publication\_number\":6189419,\"is\_number\":6195452,\"publication\_year\":2012,\"publication\_date\":\"25-30 March 2012\",\"start\_page\":\"2291\",\"end\_page\":\"2299\",\"citing\_paper\_count\":16,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Throughput\",\"Sensors\",\"Probes\",\"Protocols\",\"Cognitive radio\",\"Complexity theory\",\"Channel estimation\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"CD\",\"value\":\"978-1-4673-0774-1\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4673-0773-4\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4673-0775-8\",\"isbnType\":\"New-2005\"}]}},{\"title\":\"Towards an efficient verification approach on network configuration\",\"publisher\":\"IEEE\",\"isbn\":\"978-3-901882-48-7\",\"issn\":\"2165-963X\",\"partnum\":\"12EX7584\",\"rank\":13,\"authors\":{\"authors\":[{\"affiliation\":\"School of Computing, DePaul University, Chicago, IL 60604, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37680426100\",\"id\":37680426100,\"full\_name\":\"Khalid Elbadawi\",\"author\_order\":1},{\"affiliation\":\"School of Information Technology, Illinois State University, Normal, 61790, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":2},{\"affiliation\":\"School of Computing, DePaul University, Chicago, IL 60604, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37404156100\",\"id\":37404156100,\"full\_name\":\"James Yu\",\"author\_order\":3}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"This paper presents our new design and implementation of a configuration verification system called ConfVS. With the increasing complexity of network configuration, verifying network behavior has become a highly time-consuming and error-prone process. Much research effort has been made to tackle this challenge. In this paper, we propose a formalization scheme based on binary decision diagram to model the entire network behavior specified by diverse configuration requirements (e.g., security policies, routing policies, and address translation rules), and design a set of algorithms to efficiently verify the compliance of network behavior to the requirements. Our experiments show that ConfVS can validate thousands of network devices configured by millions rules with ten times improved efficiency when compared to several well-known existing solutions.\",\"article\_number\":\"6380024\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6380024\",\"html\_url\":\"https://ieeexplore.ieee.org/document/6380024/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/6380024/\",\"publication\_title\":\"2012 8th international conference on network and service management (cnsm) and 2012 workshop on systems virtualiztion management (svm)\",\"conference\_location\":\"Las Vegas, NV\",\"conference\_dates\":\"22-26 Oct. 2012\",\"publication\_number\":6362369,\"is\_number\":6379984,\"publication\_year\":2012,\"publication\_date\":\"22-26 Oct. 2012\",\"start\_page\":\"247\",\"end\_page\":\"251\",\"citing\_paper\_count\":0,\"citing\_patent\_count\":2,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Data structures\",\"Boolean functions\",\"IP networks\",\"Routing\",\"Security\",\"Network topology\",\"Computational modeling\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Electronic ISBN\",\"value\":\"978-3-901882-48-7\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4673-3134-0\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/ICNP.2012.6459969\",\"title\":\"On minimum delay duty-cycling protocol in sustainable sensor network\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4673-2446-5\",\"issn\":\"1092-1648\",\"partnum\":\"12EX4853\",\"rank\":14,\"authors\":{\"authors\":[{\"affiliation\":\"Illinois Institute of Technology, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37305070700\",\"id\":37305070700,\"full\_name\":\"Shaojie Tang\",\"author\_order\":1},{\"affiliation\":\"Department of CIS, Temple University, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37279156600\",\"id\":37279156600,\"full\_name\":\"Jie Wu\",\"author\_order\":2},{\"affiliation\":\"Tongji University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37277944700\",\"id\":37277944700,\"full\_name\":\"Guihai Chen\",\"author\_order\":3},{\"affiliation\":\"State Key Lab of Novel Software Technology, Nanjing University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37310514000\",\"id\":37310514000,\"full\_name\":\"Cheng Wang\",\"author\_order\":4},{\"affiliation\":\"Hong Kong Polytechnic University, Hong Kong\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38185640800\",\"id\":38185640800,\"full\_name\":\"Xuefeng Liu\",\"author\_order\":5},{\"affiliation\":\"Hong Kong Polytechnic University, Hong Kong\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38467825600\",\"id\":38467825600,\"full\_name\":\"Tao Li\",\"author\_order\":6},{\"affiliation\":\"Illinois Institute of Technology, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37280866600\",\"id\":37280866600,\"full\_name\":\"Xiang-Yang Li\",\"author\_order\":7}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"To ensure sustainable operations of wireless sensor networks, environmental energy harvesting has been well recognized as one promising solution for long-term applications. Unlike in battery-powered sensor networks, we are targeting a duty-cycle adjustment to optimize the network performance, e.g., delay minimization, with full harvested energy utilization. In this paper, we introduce a set of duty-cycle adjustment schemes that will minimize cross traffic delay (CTD) in energy-harvesting sensor networks. We first present an offline solution by assuming that the link reliability and traffic distribution are known a priori. Based on the submodular property of the CTD function, we theoretically prove that a simple greedy algorithm can achieve constant approximation. We next propose a class of online algorithms that do not require the knowledge of link reliability and traffic distribution. For each of these algorithms, we give a theoretical bound on the performance. We have evaluated our design with a TelosB-based implementation and experimental results corroborate our theoretical analysis.\",\"article\_number\":\"6459969\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6459969\",\"html\_url\":\"https://ieeexplore.ieee.org/document/6459969/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/6459969/\",\"publication\_title\":\"2012 20th IEEE International Conference on Network Protocols (ICNP)\",\"conference\_location\":\"Austin, TX\",\"conference\_dates\":\"30 Oct.-2 Nov. 2012\",\"publication\_number\":6424016,\"is\_number\":6459930,\"publication\_year\":2012,\"publication\_date\":\"30 Oct.-2 Nov. 2012\",\"start\_page\":\"1\",\"end\_page\":\"9\",\"citing\_paper\_count\":2,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Schedules\",\"Delay\",\"Algorithm design and analysis\",\"Approximation algorithms\",\"Reliability\",\"Greedy algorithms\",\"Protocols\"]},\"author\_terms\":{\"terms\":[\"Wireless sensor networks\",\"solar powered\",\"duty-cycle\",\"submodular\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Online ISBN\",\"value\":\"978-1-4673-2446-5\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4673-2445-8\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4673-2447-2\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/GLOCOM.2012.6503118\",\"title\":\"Delay Minimum Data Collection in the low-duty-cycle wireless sensor networks\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4673-0919-6\",\"issn\":\"1930-529X\",\"partnum\":\"12CH38957\",\"rank\":15,\"authors\":{\"authors\":[{\"affiliation\":\"State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38004252000\",\"id\":38004252000,\"full\_name\":\"Shuyun Luo\",\"author\_order\":1},{\"affiliation\":\"School of Software, Tsinghua University, Beijing, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37401838100\",\"id\":37401838100,\"full\_name\":\"Xufei Mao\",\"author\_order\":2},{\"affiliation\":\"State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37597396100\",\"id\":37597396100,\"full\_name\":\"Yongmei Sun\",\"author\_order\":3},{\"affiliation\":\"State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37287371200\",\"id\":37287371200,\"full\_name\":\"Yuefeng Ji\",\"author\_order\":4},{\"affiliation\":\"Illinois Institute of Technology, Chicago, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37305070700\",\"id\":37305070700,\"full\_name\":\"Shaojie Tang\",\"author\_order\":5}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"In low-duty-cycle wireless sensor networks, wireless nodes usually have two states: active state and dormant state. The necessary condition for a successful wireless transmission is that both the sender and the receiver are awake. In this paper, we study the problem: How fast can raw data be collected from all source nodes to a sink in low-duty-cycle WSNs? To address this, we define the Minimum Data Collection Delay (MDCD) problem, and give both the lower and upper tight bounds on the minimum delay for data collection when interfering links are eliminated. Furthermore, a novel concept, Virtual Grid Network (VGN) is introduced to successfully convert the MDCD problem into max-flow problem, and present a MDCD algorithm enlightened by the Ford-fulkerson max-flow method, which is able to find an optimal solution in polynomial time and achieves the lower bound. Extensive simulations are conducted and the results show that the proposed MDCD algorithm significantly outperforms the Shortest Path Routing algorithm (up to 32%) and achieves the lower bound.\",\"article\_number\":\"6503118\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6503118\",\"html\_url\":\"https://ieeexplore.ieee.org/document/6503118/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/6503118/\",\"publication\_title\":\"2012 IEEE Global Communications Conference (GLOBECOM)\",\"conference\_location\":\"Anaheim, CA\",\"conference\_dates\":\"3-7 Dec. 2012\",\"publication\_number\":6490098,\"is\_number\":6503052,\"publication\_year\":2012,\"publication\_date\":\"3-7 Dec. 2012\",\"start\_page\":\"232\",\"end\_page\":\"237\",\"citing\_paper\_count\":2,\"citing\_patent\_count\":0,\"index\_terms\":{},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Online ISBN\",\"value\":\"978-1-4673-0919-6\",\"isbnType\":\"New-2005\"},{\"format\":\"Print ISBN\",\"value\":\"978-1-4673-0920-2\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4673-0921-9\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/JSYST.2014.2323266\",\"title\":\"Real-Time Detection of False Data Injection in Smart Grid Networks: An Adaptive CUSUM Method and Analysis\",\"publisher\":\"IEEE\",\"issue\":\"2\",\"issn\":\"2373-7816\",\"rank\":16,\"volume\":\"10\",\"authors\":{\"authors\":[{\"affiliation\":\"Department of Electrical and Computer Engineering, University of Houston, Houston, TX, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38065545600\",\"id\":38065545600,\"full\_name\":\"Yi Huang\",\"author\_order\":1},{\"affiliation\":\"Department of Electronics and Computer Engineering, Illinois Institute of Technology, Chicago, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37402550400\",\"id\":37402550400,\"full\_name\":\"Jin Tang\",\"author\_order\":2},{\"affiliation\":\"Department of Electronics and Computer Engineering, Illinois Institute of Technology, Chicago, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085800774\",\"id\":37085800774,\"full\_name\":\"Yu Cheng\",\"author\_order\":3},{\"affiliation\":\"Department of Electrical Engineering and Computer Science, University of Tennessee, Knoxville, TN, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37311296400\",\"id\":37311296400,\"full\_name\":\"Husheng Li\",\"author\_order\":4},{\"affiliation\":\"Department of Electronics and Computer Engineering, Boise State University, Boise, ID, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37396230200\",\"id\":37396230200,\"full\_name\":\"Kristy A. Campbell\",\"author\_order\":5},{\"affiliation\":\"Department of Electrical and Computer Engineering, University of Houston, Houston, TX, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37278605300\",\"id\":37278605300,\"full\_name\":\"Zhu Han\",\"author\_order\":6}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Journals\",\"abstract\":\"A smart grid is delay sensitive and requires the techniques that can identify and react on the abnormal changes (i.e., system fault, attacker, shortcut, etc.) in a timely manner. In this paper, we propose a real-time detection scheme against false data injection attack in smart grid networks. Unlike the classical detection test, the proposed algorithm is able to tackle the unknown parameters with low complexity and process multiple measurements at once, leading to a shorter decision time and a better detection accuracy. The objective is to detect the adversary as quickly as possible while satisfying certain detection error constraints. A Markov-chain-based analytical model is constructed to systematically analyze the proposed scheme. With the analytical model, we are able to configure the system parameters for guaranteed performance in terms of false alarm rate, average detection delay, and missed detection ratio under a detection delay constraint. The simulations are conducted with MATPOWER 4.0 package for different IEEE test systems.\",\"article\_number\":\"6949126\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6949126\",\"html\_url\":\"https://ieeexplore.ieee.org/document/6949126/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/6949126/\",\"publication\_title\":\"IEEE Systems Journal\",\"publication\_number\":4267003,\"is\_number\":7482862,\"publication\_year\":2016,\"publication\_date\":\"June 2016\",\"start\_page\":\"532\",\"end\_page\":\"543\",\"citing\_paper\_count\":72,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Smart grids\",\"Analytical models\",\"Delays\",\"State estimation\",\"Real-time systems\",\"Tin\",\"Power measurement\"]},\"author\_terms\":{\"terms\":[\"Abnormal detection\",\"CUSUM\",\"false data injection attack\",\"network security\",\"signal detection and estimation\",\"smart grid\",\"quickest detection\",\"Abnormal detection\",\"CUSUM\",\"false data injection attack\",\"network security\",\"signal detection and estimation\",\"smart grid\",\"quickest detection\"]}}},{\"doi\":\"10.1109/INFCOMW.2016.7562246\",\"title\":\"An adaptable CS-based transmission scheme validated on the real-world system\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4673-9956-2\",\"rank\":17,\"authors\":{\"authors\":[{\"affiliation\":\"School of Information Engineering, Yancheng Teachers University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085859997\",\"id\":37085859997,\"full\_name\":\"Hao Yang\",\"author\_order\":1},{\"affiliation\":\"School of Information Engineering, Yancheng Teachers University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085851797\",\"id\":37085851797,\"full\_name\":\"Keming Tang\",\"author\_order\":2},{\"affiliation\":\"School of Information Engineering, Yancheng Teachers University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085850219\",\"id\":37085850219,\"full\_name\":\"Hua Xu\",\"author\_order\":3},{\"affiliation\":\"School of Information Engineering, Yancheng Teachers University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085852564\",\"id\":37085852564,\"full\_name\":\"Licai Zhu\",\"author\_order\":4},{\"affiliation\":\"Department of Computer Science, Northeastern Illinois University, United States\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085863477\",\"id\":37085863477,\"full\_name\":\"Xiwei Wang\",\"author\_order\":5},{\"affiliation\":\"School of Software and TNList, Tsinghua University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085850420\",\"id\":37085850420,\"full\_name\":\"Kun Qian\",\"author\_order\":6}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Compressive Sampling(CS) has been utilized to save transmission consumption of sensors. In spite of the remarkable efforts the community put to a variety of designs, a everlasting issue still remains that how sensors further economize energy through referring to their CS-based execution operations, motivating us to explore the answer from a point of real deployment platform view. In our work, we propose an adaptable CS-based transmission scheme, ACS, which is not mutually exclusive but forms a complementary unity with the traditional scheme. According to experimental validations on our real-world operating sensor network, energy of sensors will be economized at least 15% compared to the existing methods.\",\"article\_number\":\"7562246\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7562246\",\"html\_url\":\"https://ieeexplore.ieee.org/document/7562246/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/7562246/\",\"publication\_title\":\"2016 IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)\",\"conference\_location\":\"San Francisco, CA\",\"conference\_dates\":\"10-14 April 2016\",\"publication\_number\":7556623,\"is\_number\":7561992,\"publication\_year\":2016,\"publication\_date\":\"10-14 April 2016\",\"start\_page\":\"1047\",\"end\_page\":\"1048\",\"citing\_paper\_count\":0,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Wireless sensor networks\",\"Operating systems\",\"Compressed sensing\",\"Energy measurement\",\"Sensor systems\",\"Current measurement\"]},\"author\_terms\":{\"terms\":[\"Compressive sensing\",\"Data transmission\",\"Adaptable transmission\",\"Wireless sensor network\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Print on Demand(PoD) ISBN\",\"value\":\"978-1-4673-9956-2\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4673-9955-5\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/IWQoS.2016.7590437\",\"title\":\"Towards QoE assessment of encrypted YouTube adaptive video streaming in mobile networks\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-5090-2635-7\",\"rank\":18,\"authors\":{\"authors\":[{\"affiliation\":\"School of Computer Science and Engineering, Southeast University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085878450\",\"id\":37085878450,\"full\_name\":\"Wubin Pan\",\"author\_order\":1},{\"affiliation\":\"School of Computer Science and Engineering, Southeast University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085875003\",\"id\":37085875003,\"full\_name\":\"Gaung Cheng\",\"author\_order\":2},{\"affiliation\":\"School of Computer Science and Engineering, Southeast University, China\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37715614900\",\"id\":37715614900,\"full\_name\":\"Hua Wu\",\"author\_order\":3},{\"affiliation\":\"School of Information Technology, Illinois State University, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":4}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Video streaming has become one of the most prevalent mobile applications, and takes a huge portion of the traffic on mobile networks today. YouTube is one of the most popular and volume-dominant video content providers. Understanding the user perception on the quality (i.e., Quality of Experience or QoE) of YouTube video streaming services is thus paramount for the content provider as well as its content delivery network (CDN) providers. Although various video QoE assessment approaches proposed to use different Key Performance Indicators (KPIs), they are all essentially related to a common parameter: Bitrate. However, after YouTube adopted HTTPS as its adaptive video streaming method to better protect user privacy and network security, bitrate cannot be obtained anymore from encrypted video traffic via typical deep packet inspection (DPI) method. In this paper, we tackle this challenge by proposing a machine learning based bitrate estimation (MBE) approach to parse bitrate information from IP packet level measurement. For evaluating the effectiveness of MBE, we have chosen video Mean Opinion Score (vMOS) proposed by a leading telecom vendor, as the QoE assessment framework, and have conducted comprehensive experiments to study the impact of bitrate estimation accuracy on its KPIs for HTTPS YouTube video streaming service. Experimental results show that MBE is a feasible and highly effective approach to obtain in real time the bitrate information from encrypted video streaming traffic.\",\"article\_number\":\"7590437\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7590437\",\"html\_url\":\"https://ieeexplore.ieee.org/document/7590437/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/7590437/\",\"publication\_title\":\"2016 IEEE/ACM 24th International Symposium on Quality of Service (IWQoS)\",\"conference\_location\":\"Beijing\",\"conference\_dates\":\"20-21 June 2016\",\"publication\_number\":7584862,\"is\_number\":7590385,\"publication\_year\":2016,\"publication\_date\":\"20-21 June 2016\",\"start\_page\":\"1\",\"end\_page\":\"6\",\"citing\_paper\_count\":1,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Streaming media\",\"YouTube\",\"Bit rate\",\"Servers\",\"Cryptography\",\"Adaptive systems\",\"Mobile communication\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Print on Demand(PoD) ISBN\",\"value\":\"978-1-5090-2635-7\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-5090-2634-0\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/CDC.2016.7798284\",\"title\":\"On the analysis of a continuous-time bi-virus model\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-5090-1838-3\",\"rank\":19,\"authors\":{\"authors\":[{\"affiliation\":\"Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign, United States of America\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086067371\",\"id\":37086067371,\"full\_name\":\"Ji Liu\",\"author\_order\":1},{\"affiliation\":\"Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign, United States of America\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085409865\",\"id\":37085409865,\"full\_name\":\"Philip E. Paré\",\"author\_order\":2},{\"affiliation\":\"Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign, United States of America\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38115746000\",\"id\":38115746000,\"full\_name\":\"Angelia Nedic\",\"author\_order\":3},{\"affiliation\":\"ECE Department at the University of Oklahoma, United States of America\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086064296\",\"id\":37086064296,\"full\_name\":\"Choon Yik Tang\",\"author\_order\":4},{\"affiliation\":\"Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign, United States of America\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086067055\",\"id\":37086067055,\"full\_name\":\"Carolyn L. Beck\",\"author\_order\":5},{\"affiliation\":\"Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign, United States of America\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37269539100\",\"id\":37269539100,\"full\_name\":\"Tamer Basar\",\"author\_order\":6}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"This paper studies a distributed continuous-time bi-virus model for a system of groups of individuals. An in-depth stability analysis is performed for the healthy and epidemic equilibria. Sensitivity properties of some nontrivial equilibria are also investigated.\",\"article\_number\":\"7798284\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7798284\",\"html\_url\":\"https://ieeexplore.ieee.org/document/7798284/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/7798284/\",\"publication\_title\":\"2016 IEEE 55th Conference on Decision and Control (CDC)\",\"conference\_location\":\"Las Vegas, NV\",\"conference\_dates\":\"12-14 Dec. 2016\",\"publication\_number\":7786694,\"is\_number\":7798233,\"publication\_year\":2016,\"publication\_date\":\"12-14 Dec. 2016\",\"start\_page\":\"290\",\"end\_page\":\"295\",\"citing\_paper\_count\":15,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Stability analysis\",\"Silicon\",\"Asymptotic stability\",\"Sensitivity\",\"Analytical models\",\"Eigenvalues and eigenfunctions\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Print on Demand(PoD) ISBN\",\"value\":\"978-1-5090-1838-3\",\"isbnType\":\"New-2005\"},{\"format\":\"DVD ISBN\",\"value\":\"978-1-5090-1844-4\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-5090-1837-6\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/ICC.2017.7996962\",\"title\":\"eOpenFlow: Software defined sampling via a highly adoptable OpenFlow extension\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-4673-9000-2\",\"issn\":\"1938-1883\",\"rank\":20,\"authors\":{\"authors\":[{\"affiliation\":\"School of Computer Science and Engineering, Key Laboratory of Computer Network & Information Integration, (Southeast University), Ministry of Education, Southeast University, Nanjing, P.R. China 211189\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37653483600\",\"id\":37653483600,\"full\_name\":\"Guang Cheng\",\"author\_order\":1},{\"affiliation\":\"School of Information Technology, Illinois State University, Normal, IL, USA, 61790-5150\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086029489\",\"id\":37086029489,\"full\_name\":\"Yongning Tang\",\"author\_order\":2}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Sampling is highly demanded in software defined networking (SDN) by the need to control the consumption of network measurement resources and by the need of detailed measurements from applications and service providers. Open-Flow, as the standard control protocol between SDN controller and switches, is not equipped with traffic sampling function. In this paper, we proposes a software defined sampling measurement scheme via an adoptable extension to OpenFlow called eOpenFlow. In the data plane of SDN switch, the sampling action OFPAT\_OUTPUT\_SAMPLING is added to sample user defined specific traffic flows. We present two different sampling rules, which are based on multi-level flow table and group-based table mechanisms, respectively. In SDN control plane, collected network samples are analyzed to realize various measurement functions. eOpenFlow has been implemented, and further evaluated via carefully designed experiments in order to verify its different sampling functions.\",\"article\_number\":\"7996962\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7996962\",\"html\_url\":\"https://ieeexplore.ieee.org/document/7996962/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/7996962/\",\"publication\_title\":\"2017 IEEE International Conference on Communications (ICC)\",\"conference\_location\":\"Paris\",\"conference\_dates\":\"21-25 May 2017\",\"publication\_number\":7985734,\"is\_number\":7996317,\"publication\_year\":2017,\"publication\_date\":\"21-25 May 2017\",\"start\_page\":\"1\",\"end\_page\":\"6\",\"citing\_paper\_count\":0,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Current measurement\",\"Control systems\",\"Software measurement\",\"Sampling methods\",\"Software\",\"Protocols\",\"Radiation detectors\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Print on Demand(PoD) ISBN\",\"value\":\"978-1-4673-9000-2\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-4673-8999-0\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/TAC.2019.2898515\",\"title\":\"Analysis and Control of a Continuous-Time Bi-Virus Model\",\"publisher\":\"IEEE\",\"issue\":\"12\",\"issn\":\"2334-3303\",\"rank\":21,\"volume\":\"64\",\"authors\":{\"authors\":[{\"affiliation\":\"Department of Electrical and Computer Engineering, Stony Brook University, Centereach, NY, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085354103\",\"id\":37085354103,\"full\_name\":\"Ji Liu\",\"author\_order\":1},{\"affiliation\":\"Division of Decision and Control Systems, KTH Royal Institute of Technology, Stockholm, Sweden\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085409865\",\"id\":37085409865,\"full\_name\":\"Philip E. Paré\",\"author\_order\":2},{\"affiliation\":\"School of Electrical, Computer and Energy Engineering, Arizona State University, Tempe, AZ, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38115746000\",\"id\":38115746000,\"full\_name\":\"Angelia Nedic\",\"author\_order\":3},{\"affiliation\":\"School of Electrical and Computer Engineering, University of Oklahoma, Norman, OK, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37424018700\",\"id\":37424018700,\"full\_name\":\"Choon Yik Tang\",\"author\_order\":4},{\"affiliation\":\"Coordinated Science Laboratory, University of Illinois at Urbana-Champaign, Champaign, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37266765300\",\"id\":37266765300,\"full\_name\":\"Carolyn L. Beck\",\"author\_order\":5},{\"affiliation\":\"Coordinated Science Laboratory, University of Illinois at Urbana-Champaign, Champaign, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37269539100\",\"id\":37269539100,\"full\_name\":\"Tamer Basar\",\"author\_order\":6}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Journals\",\"abstract\":\"This paper studies a distributed continuous-time bi-virus model in which two competing viruses spread over a network consisting of multiple groups of individuals. Limiting behaviors of the network are characterized by analyzing the equilibria of the system and their stability. Specifically, when the two viruses spread over possibly different directed infection graphs, the system may have the following: first, a unique equilibrium, the healthy state, which is globally stable, implying that both viruses will eventually be eradicated, second, two equilibria including the healthy state and a dominant virus state, which is almost globally stable, implying that one virus will pervade the entire network causing a single-virus epidemic while the other virus will be eradicated, or third, at least three equilibria including the healthy state and two dominant virus states, depending on certain conditions on the healing and infection rates. When the two viruses spread over the same directed infection graph, the system may have zero or infinitely many coexisting epidemic equilibria, which represents the pervasion of the two viruses. Sensitivity properties of some nontrivial equilibria are investigated in the context of a decentralized control technique, and an impossibility result is given for a certain type of distributed feedback controller.\",\"article\_number\":\"8638525\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8638525\",\"html\_url\":\"https://ieeexplore.ieee.org/document/8638525/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/8638525/\",\"publication\_title\":\"IEEE Transactions on Automatic Control\",\"publication\_number\":9,\"is\_number\":8920147,\"publication\_year\":2019,\"publication\_date\":\"Dec. 2019\",\"start\_page\":\"4891\",\"end\_page\":\"4906\",\"citing\_paper\_count\":8,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Stability analysis\",\"Biological system modeling\",\"Analytical models\",\"Mathematical model\",\"Limiting\",\"Distributed feedback devices\"]},\"author\_terms\":{\"terms\":[\"Competing viruses\",\"computer viruses\",\"epidemic processes\",\"networked control systems\",\"nonlinear control systems\"]}}},{\"doi\":\"10.1109/ISBI.2019.8759373\",\"title\":\"Identifying Configurational Abnormalities in Alzheimer’S Disease Progression Using Multi-View Structure Connectome\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-5386-3642-8\",\"issn\":\"1945-7928\",\"rank\":22,\"authors\":{\"authors\":[{\"affiliation\":\"Department of Electrical and Computer Engineering, University of Pittsburgh, PA, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086886582\",\"id\":37086886582,\"full\_name\":\"Lei Guo\",\"author\_order\":1},{\"affiliation\":\"Department of Electrical and Computer Engineering, University of Pittsburgh, PA, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086883426\",\"id\":37086883426,\"full\_name\":\"Haoteng Tang\",\"author\_order\":2},{\"affiliation\":\"Computer Science and Engineering, Michigan State University, East Lansing, MI, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37085793887\",\"id\":37085793887,\"full\_name\":\"Qi Wang\",\"author\_order\":3},{\"affiliation\":\"Brigham & Women’s Hospital, Harvard Medical School, Psychiatry Neuroimaging Laboratory, Boston, MA, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/38267222300\",\"id\":38267222300,\"full\_name\":\"Emily Dennis\",\"author\_order\":4},{\"affiliation\":\"Department of Computer & Engineering, University of Texas at Arlington, Arlington, TX, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086382705\",\"id\":37086382705,\"full\_name\":\"Dajiang Zhu\",\"author\_order\":5},{\"affiliation\":\"Department of Electrical and Computer Engineering, University of Pittsburgh, PA, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086232618\",\"id\":37086232618,\"full\_name\":\"Heng Huang\",\"author\_order\":6},{\"affiliation\":\"Department of Psychiatry, University of Illinois at Chicago, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37078606800\",\"id\":37078606800,\"full\_name\":\"Olusola Ajilore\",\"author\_order\":7},{\"affiliation\":\"Department of Psychiatry, University of Illinois at Chicago, IL, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37271822200\",\"id\":37271822200,\"full\_name\":\"Alex D. Leow\",\"author\_order\":8},{\"affiliation\":\"Department of Electrical and Computer Engineering, University of Pittsburgh, PA, USA\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37977189700\",\"id\":37977189700,\"full\_name\":\"Liang Zhan\",\"author\_order\":9}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Alzheimer's disease (AD) is the most common cause of dementia and while scientists know that AD involves progressive neuronal cell loss, the reason why this occurs is still not known. As AD exerts a systems-level impact on the brain, therefore the brain structural connectome, derived from whole-brain tractography using diffusion-weighted MRI, has the potential to study the systems-level changes associated with the AD progression. Traditionally, structural connectome is reconstructed based on one single tractography algorithm and commonly involves the comparison of summary graph-theoretical metrics, which could be biased and also discard important informative graph structure. In this paper, we proposed to study the AD effect on brain structural connectome using a multi-view approach. Our results supported multi-view structural connectomics improved power in detecting early changes associated with AD disease progression.\",\"article\_number\":\"8759373\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8759373\",\"html\_url\":\"https://ieeexplore.ieee.org/document/8759373/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/8759373/\",\"publication\_title\":\"2019 IEEE 16th International Symposium on Biomedical Imaging (ISBI 2019)\",\"conference\_location\":\"Venice, Italy\",\"conference\_dates\":\"8-11 April 2019\",\"publication\_number\":8754684,\"is\_number\":8759097,\"publication\_year\":2019,\"publication\_date\":\"8-11 April 2019\",\"start\_page\":\"169\",\"end\_page\":\"172\",\"citing\_paper\_count\":0,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Brain\",\"Magnetic resonance imaging\",\"Diseases\",\"Optical fiber networks\",\"Probabilistic logic\",\"Biomedical imaging\"]},\"author\_terms\":{\"terms\":[\"modular configuration\",\"Alzheimer’s disease\",\"brain\",\"structural connectome\",\"diffusion MRI\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Print on Demand(PoD) ISBN\",\"value\":\"978-1-5386-3642-8\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-5386-3641-1\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/TKDE.2019.2934100\",\"title\":\"ERATO: Trading Noisy Aggregate Statistics over Private Correlated Data\",\"publisher\":\"IEEE\",\"issue\":\"99\",\"issn\":\"2326-3865\",\"rank\":23,\"volume\":\"PP\",\"authors\":{\"authors\":[{\"affiliation\":\"Department of Computer Science and Engineering, Shanghai Jiao Tong University, 12474 Shanghai, Shanghai China (e-mail: rvince@sjtu.edu.cn)\",\"full\_name\":\"Chaoyue Niu\",\"author\_order\":1},{\"affiliation\":\"Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois United States 61801 (e-mail: zhengzhenzhe@sjtu.edu.cn)\",\"full\_name\":\"Zhenzhe Zheng\",\"author\_order\":2},{\"affiliation\":\"Department of Computer Science and Engineering, Shanghai Jiao Tong University, Shanghai, ShangHai China (e-mail: fwu@cs.sjtu.edu.cn)\",\"full\_name\":\"Fan Wu\",\"author\_order\":3},{\"affiliation\":\"Department of Information Systems, University of Texas at Dallas, Richardson, Texas United States (e-mail: tangshaojie@gmail.com)\",\"full\_name\":\"Shaojie Tang\",\"author\_order\":4},{\"affiliation\":\"Department of Computer Science and Engineering, Shanghai Jiao Tong University, 12474 Shanghai, Shanghai China 200240 (e-mail: gao-xf@cs.sjtu.edu.cn)\",\"full\_name\":\"Xiaofeng Gao\",\"author\_order\":5},{\"affiliation\":\"Department of Computer Science and Engineering, Shanghai Jiao Tong University, Shanghai, Shanghai China (e-mail: gchen@cs.sjtu.edu.cn)\",\"full\_name\":\"Guihai Chen\",\"author\_order\":6}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Early Access Articles\",\"abstract\":\"With the commoditization of personal privacy, pricing private data has become an intriguing problem. In this paper, we study noisy aggregate statistics trading from the perspective of a data broker in data markets. We thus propose ERATO, which enables aggrEgate statistics pRicing over privATe cOrrelated data. On one hand, ERATO guarantees arbitrage freeness against cunning data consumers. On the other hand, ERATO compensates data owners for their privacy losses using both bottom-up and top-down designs. We further apply ERATO to three practical aggregate statistics, namely weighted sum, probability distribution fitting, and degree distribution, and extensively evaluate their performances on MovieLens dataset, 2009 RECS dataset, and two SNAP large social network datasets, respectively. Our analysis and evaluation results reveal that ERATO well balances utility and privacy, achieves arbitrage freeness, and compensates data owners more fairly than differential privacy based approaches.\",\"article\_number\":\"8798723\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8798723\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/8798723/\",\"publication\_title\":\"IEEE Transactions on Knowledge and Data Engineering\",\"publication\_number\":69,\"is\_number\":4358933,\"publication\_year\":2019,\"start\_page\":\"1\",\"end\_page\":\"1\",\"citing\_paper\_count\":0,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Aggregates\",\"Pricing\",\"Privacy\",\"Differential privacy\",\"Correlation\",\"Data models\"]},\"author\_terms\":{\"terms\":[\"Data trading\",\"data privacy\",\"data correlation\"]}}},{\"doi\":\"10.1109/HPSR.2019.8808121\",\"title\":\"Intelligence Enabled SDN Fault Localization via Programmable In-band Network Telemetry\",\"publisher\":\"IEEE\",\"isbn\":\"978-1-7281-1687-7\",\"issn\":\"2325-5595\",\"rank\":24,\"authors\":{\"authors\":[{\"affiliation\":\"School of Information Technology, Illinois State University Normal, IL, 61790\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37308776700\",\"id\":37308776700,\"full\_name\":\"Yongning Tang\",\"author\_order\":1},{\"affiliation\":\"School of Information Technology, Illinois State University Normal, IL, 61790\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37086953884\",\"id\":37086953884,\"full\_name\":\"Yangxuan Wu\",\"author\_order\":2},{\"affiliation\":\"School of Cyberspace Security, Southeast University, Nanjing, Jiangsu, 21189\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37653483600\",\"id\":37653483600,\"full\_name\":\"Guang Cheng\",\"author\_order\":3},{\"affiliation\":\"Dept. of Computer Science, Dearborn, MI, 48128\",\"authorUrl\":\"https://ieeexplore.ieee.org/author/37399423300\",\"id\":37399423300,\"full\_name\":\"Zhiwei Xu\",\"author\_order\":4}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Conferences\",\"abstract\":\"Intelligent Fault localization for SDN becomes one of the most critical but difficult tasks. This paper proposes a new approach called Policy-Aware In-band Network Telemetry (PAINT) to tackle SDN fault localization. In the PAINT system, network operators define and deploy network services using a high-level Service Provisioning Language (SPL). Then, PAINT automatically parses the service policy to infer the causal relationship between service related network components and (end-to-end) service-level observable symptoms. Based on the causality model, PAINT deploys monitoring instruments for the symptoms. PAINT utilizes a dynamically created Symptom-Fault-Telemetry model to incorporate In-band Network Telemetry (INT) actions systematically into the fault reasoning process to improve the efficiency and accuracy of fault localization for SDN. PAINT has been extensively evaluated in a simulation environment for its accuracy and scalability with very positive results.\",\"article\_number\":\"8808121\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8808121\",\"html\_url\":\"https://ieeexplore.ieee.org/document/8808121/\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/8808121/\",\"publication\_title\":\"2019 IEEE 20th International Conference on High Performance Switching and Routing (HPSR)\",\"conference\_location\":\"Xi'An, China\",\"conference\_dates\":\"26-29 May 2019\",\"publication\_number\":8790960,\"is\_number\":8808097,\"publication\_year\":2019,\"publication\_date\":\"26-29 May 2019\",\"start\_page\":\"1\",\"end\_page\":\"6\",\"citing\_paper\_count\":1,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Monitoring\",\"Paints\",\"Telemetry\",\"Task analysis\",\"Cognition\",\"Protocols\",\"Software\"]},\"author\_terms\":{\"terms\":[\"fault Localization\",\"Policy Aware\",\"INT\",\"SDN\"]}},\"isbn\_formats\":{\"isbns\":[{\"format\":\"Print on Demand(PoD) ISBN\",\"value\":\"978-1-7281-1687-7\",\"isbnType\":\"New-2005\"},{\"format\":\"USB ISBN\",\"value\":\"978-1-7281-1685-3\",\"isbnType\":\"New-2005\"},{\"format\":\"Electronic ISBN\",\"value\":\"978-1-7281-1686-0\",\"isbnType\":\"New-2005\"}]}},{\"doi\":\"10.1109/TGRS.2020.2989183\",\"title\":\"Infrared Precipitation Estimation Using Convolutional Neural Network\",\"publisher\":\"IEEE\",\"issue\":\"99\",\"issn\":\"1558-0644\",\"rank\":25,\"volume\":\"PP\",\"authors\":{\"authors\":[{\"affiliation\":\"State Key Laboratory of Hydroscience and Engineering, Department of Hydraulic Engineering, Tsinghua University, Beijing 100084, China.\",\"full\_name\":\"Cunguang Wang\",\"author\_order\":1},{\"affiliation\":\"State Key Laboratory of Severe Weather, Chinese Academy of Meteorological Sciences, Beijing 100081, China.\",\"full\_name\":\"Jing Xu\",\"author\_order\":2},{\"affiliation\":\"Coldwater Laboratory, University of Saskatchewan, Canmore, AB T1W 3G1, Canada, and also with the Centre for Hydrology, University of Saskatchewan, Saskatoon, ST S7N 1K2, Canada (e-mail: guoqiang.tang@usask.ca)\",\"full\_name\":\"Guoqiang Tang\",\"author\_order\":3},{\"affiliation\":\"Department of Hydraulic Engineering, Tsinghua University, Beijing 100084, China. He is now with the College of Agricultural, Consumer, and Environmental Sciences, University of Illinois at Urbana-Champaign, Urbana, IL 61801 USA.\",\"full\_name\":\"Yi Yang\",\"author\_order\":4},{\"affiliation\":\"School of Civil Engineering and Environmental Science, University of Oklahoma, Norman, OK 73019 USA (e-mail: yanghong@ou.edu)\",\"full\_name\":\"Yang Hong\",\"author\_order\":5}]},\"access\_type\":\"LOCKED\",\"content\_type\":\"Early Access Articles\",\"abstract\":\"Infrared (IR) information is fundamental to global precipitation estimation. Although researchers have developed numerous IR-based retrieval algorithms, there is still plenty of scope for promoting their accuracy. This article develops a novel deep learning-based algorithm entitled infrared precipitation estimation using a convolutional neural network (IPEC). Based on the five-channel IR data, the IPEC first identifies the precipitation occurrence and then estimates the precipitation rates at hourly and 0.04° x 0.04° resolutions. The performance of the IPEC is validated using the Stage-IV radar-gauge-combined data and compared to the Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks-Cloud Classification System (PERSIANN-CCS) in three subregions over the continental United States (CONUS). The results show that the five-channel input is more efficient in precipitation estimation than the commonly used one-channel input. The IPEC estimates based on the five-channel input show better statistical performance than the PERSIANN-CCS with 34.9% gain in Pearson's correlation coefficient (CC), 38.0% gain in relative bias (BIAS), and 45.2% gain in mean squared error (MSE) during the testing period from June to August 2014 over the central CONUS. Furthermore, the optimized IPEC model is applied in totally independent periods and regions, and still achieves significantly better performance than the PERSIANN-CCS, indicating that the IPEC has a stronger generalization capability. On the whole, this article proves the effectiveness of the convolutional neural network (CNN) combined with the physical multichannel inputs in IR precipitation retrieval. This end-to-end deep learning algorithm shows the potential for serving as an operational technique that can be applied globally and provides a new perspective for the future development of satellite precipitation retrievals.\",\"article\_number\":\"9085928\",\"pdf\_url\":\"https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9085928\",\"abstract\_url\":\"https://ieeexplore.ieee.org/document/9085928/\",\"publication\_title\":\"IEEE Transactions on Geoscience and Remote Sensing\",\"publication\_number\":36,\"is\_number\":4358825,\"publication\_year\":2020,\"start\_page\":\"1\",\"end\_page\":\"14\",\"citing\_paper\_count\":1,\"citing\_patent\_count\":0,\"index\_terms\":{\"ieee\_terms\":{\"terms\":[\"Estimation\",\"Satellites\",\"Meteorology\",\"Remote sensing\",\"Clouds\",\"Feature extraction\",\"Deep learning\"]},\"author\_terms\":{\"terms\":[\"Continental United States (CONUS)\",\"convolutional neural network (CNN)\",\"deep learning\",\"infrared (IR) precipitation estimation.\"]}}}]}"

# convert the JSON data to a data frame  
get\_text\_json1 <- fromJSON(get\_text1, flatten = TRUE)  
get\_text\_df1 <- as.data.frame(get\_text\_json1)

# convert the JSON data to a data frame  
get\_text\_json1 <- fromJSON(get\_text1, flatten = TRUE)  
get\_text\_df1 <- as.data.frame(get\_text\_json1)

head(get\_text\_df1$articles.title)

## [1] "Sharing end-user negative symptoms for improving overlay network dependability"   
## [2] "RASPberry: A stable reader activation scheduling protocol in multi-reader RFID systems"   
## [3] "Parameter Extraction of Short-Channel a-Si:H TFT Including Self-Heating Effect and Drain Current Nonsaturation"  
## [4] "DREAM: On the reaction delay in large scale wireless networks with mobile sensors"   
## [5] "DAWN: Energy efficient data aggregation in WSN with mobile sinks"   
## [6] "Virtual Ion Selective Electrode for Online Measurement of Nutrient Solution Components"

# 2. Publication\_title= IEEE Transactions on Visualization and Computer Graphics  
# Publication\_year=2018  
  
# c. Use the results query to recreate your request  
url2 <- "http://ieeexploreapi.ieee.org/api/v1/search/articles?"  
key2 <- "apikey=ycjb34xarj885mhkfx2qg38r"  
format2 <- "&format=json&max\_records=25&start\_record=1&sort\_order=asc&sort\_field=article\_number"  
search.terms2 <- "&publication\_title=IEEE+Transactions+on+Visualization+and+Computer+Graphics&publication\_year=2018"

# we will use the paste0 package to pull everything into a single string  
z2 <- paste0(url2,key2,format2,search.terms2)

# we will now use the httr package GET function to connect to the IEEE API  
# GET is upper case - R is case sensitive  
y2 <- GET(z2)  
get\_text2 <- content(y2, "text")

# convert the JSON data to a data frame  
get\_text\_json2 <- fromJSON(get\_text2, flatten = TRUE)  
get\_text\_df2 <- as.data.frame(get\_text\_json2)

head(get\_text\_df2$articles.title)

## [1] "Evaluating Cartogram Effectiveness"   
## [2] "Sounding Solid Combustibles: Non-Premixed Flame Sound Synthesis for Different Solid Combustibles"   
## [3] "Realistic Data-Driven Traffic Flow Animation Using Texture Synthesis"   
## [4] "Effects of Different Types of Virtual Reality Display on Presence and Learning in a Safety Training Scenario"  
## [5] "Line Graph or Scatter Plot? Automatic Selection of Methods for Visualizing Trends in Time Series"   
## [6] "Infill Optimization for Additive Manufacturing—Approaching Bone-Like Porous Structures"

# 3. index\_terms=python  
# publication\_year=2019  
  
# c. Use the results query to recreate your request  
url3 <- "http://ieeexploreapi.ieee.org/api/v1/search/articles?"  
key3 <- "apikey=ycjb34xarj885mhkfx2qg38r"  
format3 <- "&format=json&max\_records=25&start\_record=1&sort\_order=asc&sort\_field=article\_number"  
search.terms3 <- "&index\_terms=python&publication\_year=2019"

# we will use the paste0 package to pull everything into a single string  
z3 <- paste0(url3,key3,format3,search.terms3)

# we will now use the httr package GET function to connect to the IEEE API  
# GET is upper case - R is case sensitive  
y3 <- GET(z3)  
get\_text3 <- content(y3, "text")

# convert the JSON data to a data frame  
get\_text\_json3 <- fromJSON(get\_text3, flatten = TRUE)  
get\_text\_df3 <- as.data.frame(get\_text\_json3)

head(get\_text\_df3$articles.title)

## [1] "SNC: A Cloud Service Platform for Symbolic-Numeric Computation Using Just-In-Time Compilation"   
## [2] "Mist: Efficient Dissemination of Erasure-Coded Data in Data Centers"   
## [3] "A Graph Based Image Interpretation Method Using A Priori Qualitative Inclusion and Photometric Relationships"  
## [4] "ChromStruct 4: A Python Code to Estimate the Chromatin Structure from Hi-C Data"   
## [5] "Preserving Command Line Workflow for a Package Management System Using ASCII DAG Visualization"   
## [6] "Vistrates: A Component Model for Ubiquitous Analytics"

# 4.index\_terms=javascript  
# publication\_year=2019  
  
# c. Use the results query to recreate your request  
url4 <- "http://ieeexploreapi.ieee.org/api/v1/search/articles?"  
key4 <- "apikey=ycjb34xarj885mhkfx2qg38r"  
format4 <- "&format=json&max\_records=25&start\_record=1&sort\_order=asc&sort\_field=article\_number"  
search.terms4 <- "&index\_terms=javascript&publication\_year=2019"

# we will use the paste0 package to pull everything into a single string  
z4 <- paste0(url4,key4,format4,search.terms4)

# we will now use the httr package GET function to connect to the IEEE API  
# GET is upper case - R is case sensitive  
y4 <- GET(z4)  
get\_text4 <- content(y4, "text")

# convert the JSON data to a data frame  
get\_text\_json4 <- fromJSON(get\_text4, flatten = TRUE)  
get\_text\_df4 <- as.data.frame(get\_text\_json4)

head(get\_text\_df4$articles.title)

## [1] "Gray Computing: A Framework for Computing with Background JavaScript Tasks"   
## [2] "Toward Analysis and Bug Finding in JavaScript Web Applications in the Wild"   
## [3] "An Innovative Methodology for Big Data Visualization for Telemedicine"   
## [4] "BridgeTaint: A Bi-Directional Dynamic Taint Tracking Method for JavaScript Bridges in Android Hybrid Applications"  
## [5] "Vistrates: A Component Model for Ubiquitous Analytics"   
## [6] "Enhancing Web-based Analytics Applications through Provenance"

# Step 5: Use the data from above and ggplot2 and create a barchart to show which topic (javascript or python) was more popular in 2019  
library(tidyverse)

## -- Attaching packages ----------------------------------------------------------------- tidyverse 1.3.0 --

## v ggplot2 3.3.2 v purrr 0.3.4  
## v tibble 3.0.3 v dplyr 1.0.2  
## v tidyr 1.1.2 v stringr 1.4.0  
## v readr 1.3.1 v forcats 0.5.0

## -- Conflicts -------------------------------------------------------------------- tidyverse\_conflicts() --  
## x dplyr::filter() masks stats::filter()  
## x purrr::flatten() masks jsonlite::flatten()  
## x dplyr::lag() masks stats::lag()

# Identifying which row which row go with each dataframe  
get\_text\_df3['df']<-'python'  
get\_text\_df4['df']<-'javascript'

# combining the new dataframes  
New\_data<-rbind(get\_text\_df3, get\_text\_df4)

# Plotting the counts of bith topics  
plot<-ggplot(data = New\_data, aes(x=df))+geom\_bar()  
  
plot

