

## Products

### **Title: A novel extreme adaptive GRU for multivariate time series forecasting**

Report: 2024/2148788

Product Type: Journal Article

Published Status: Published

Published Date: 2024-02-05

Peer Reviewed: Yes

URL: <http://dx.doi.org/10.1038/s41598-024-53460-y>

Title: A novel extreme adaptive GRU for multivariate time series forecasting

Abstract:

Multivariate time series forecasting is a critical problem in many real-world scenarios. Recent advances in deep learning have significantly enhanced the ability to tackle such problems. However, a primary challenge in time series forecasting comes from the imbalanced time series data that include extreme events. Despite being a small fraction of the data instances, extreme events can have a negative impact on forecasting as they deviate from the majority. However, many recent time series forecasting methods neglect this issue, leading to suboptimal performance. To address these challenges, we introduce a novel model, the Extreme Event Adaptive Gated Recurrent Unit (eGRU), tailored explicitly for forecasting tasks. The eGRU is designed to effectively learn both normal and extreme event patterns within time series data. Furthermore, we introduce a time series data segmentation technique that divides the input sequence into segments, each comprising multiple time steps. This segmentation empowers the eGRU to capture data patterns at different time step resolutions while simultaneously reducing the overall input length. We conducted comprehensive experiments on four real-world benchmark datasets to evaluate the eGRU's performance. Our results showcase its superiority over vanilla RNNs, LSTMs, GRUs, and other state-of-the-art RNN variants in multivariate time series forecasting. Additionally, we conducted ablation studies to demonstrate the consistently superior performance of eGRU in generating accurate forecasts while incorporating a diverse range of labeling results.

DOI: 10.1038/s41598-024-53460-y

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Publisher: Springer Science and Business Media LLC

Journal: Scientific Reports

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Attached Document: A novel extreme adaptive GRU for multivariate time series forecasting.pdf

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## **Title: A Novel Spatial Data Pipeline for Orchestrating Apache NiFi/MiNiFi**

Report: 2024/2148788

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Published Status: Published

Published Date: 2023-11-01

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URL: <http://dx.doi.org/10.4018/ijsi.333164>

Title: A Novel Spatial Data Pipeline for Orchestrating Apache NiFi/MiNiFi

Abstract:

In many smart city projects, a common choice to capture spatial information is the inclusion of lidar data, but this decision will often invoke severe growing pains within the existing infrastructure. In this article, the authors introduce a data pipeline that orchestrates Apache NiFi (NiFi), Apache MiNiFi (MiNiFi), and several other tools as an automated solution to relay and archive lidar data captured by deployed edge devices. The lidar sensors utilized within this workflow are Velodyne Ultra Puck sensors that produce 6-7 GB packet capture (PCAP) files per hour. By both compressing the file after capturing it and compressing the file in real-time; it was discovered that GZIP and XZ both saved considerable file size being from 2-5 GB, 5 minutes in transmission time, and considerable CPU time. To evaluate the capabilities of the system design, the features of this data pipeline were compared against existing third-party services, Globus and RSync.

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Attached Document: A Novel Spatial Data Pipeline for Orchestrating Apache NiFiMiNiFi.pdf

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**Title: Assessment of the Effects of the 2021 Caldor Megafire on Soil Physical Properties, Eastern Sierra Nevada, USA**

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Published Date: 2023-02-11

Peer Reviewed: Yes

URL: <http://dx.doi.org/10.3390/fire6020066>

Title: Assessment of the Effects of the 2021 Caldor Megafire on Soil Physical Properties, Eastern Sierra Nevada, USA

Abstract:

The Caldor fire burned ~222,000 acres of the Eastern Sierra Nevada during summer–fall 2021. We evaluated the effects of this “megafire” on the physical properties of a sandy soil developed from glacial tills to document fire-induced soil modifications in this region. We measured soil water retention and hydraulic conductivity functions as well as the thermal properties of five core samples from control (unburned) areas and eight core samples from burned soil of the same soil unit. Soil water repellency was measured in terms of water drop penetration time (WDPT) in the field and apparent contact angle in the laboratory on control and burned soil as well as ash samples. Soil organic matter (SOM) and particle and aggregate size distributions were determined on control and burned soil samples. Additionally, scanning electron microscopy (SEM) was used to image microaggregates of control and burned soil samples. We found a significant difference in SOM content and sand and silt aggregate size distribution between control and burned samples, which we associated with the disintegration of microaggregates due to the fire. We found no significant difference between soil water retention and hydraulic conductivity functions of control and burned soil but observed greater variation in saturated hydraulic conductivity and systematic shifts in thermal conductivity functions of burned compared to control samples. WDPT and apparent contact angle values were significantly higher for burned soils, indicating the occurrence of fire-induced soil hydrophobicity (FISH). Interestingly, the average apparent contact angle of the control soil was  $>90^\circ$ , indicating that even the unburned soil was hydrophobic. However, the ash on top of the burned soil was found to be hydrophilic, having apparent contact angles  $<10^\circ$ . Our results indicate that SOM and microaggregates were readily affected by the Caldor fire, even for sandy soil with a weakly developed structure. The fire seemed to have moderated thermal properties, significantly and soil wettability but had only minimal effects on water retention and hydraulic conductivity functions. Our findings demonstrate the complex nature of fire-soil interactions in a natural environment and highlight the need for additional investigation into the causes and processes associated with FISH and structure alterations due to fire to improve our ability to rapidly determine potential problem areas in terms of hazards commonly associated with fire-affected soils.

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## **Title: A Virtual Reality Mining Training Simulator for Proximity Detection**

Report: 2024/2148788

Product Type: Conference Proceedings

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URL: [http://dx.doi.org/10.1007/978-3-031-28332-1\\_44](http://dx.doi.org/10.1007/978-3-031-28332-1_44)

Title: A Virtual Reality Mining Training Simulator for Proximity Detection

DOI: 10.1007/978-3-031-28332-1\_44

Forum Name: Advances in Intelligent Systems and Computing

Details:

RII Support: Partial

Federal Support Acknowledged: Yes

Attached Document: A Virtual Reality Mining Training Simulator for Proximity Detection.pdf

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## **Title: Charcoal analysis for temperature reconstruction with infrared spectroscopy**

Report: 2024/2148788

Product Type: Journal Article

Published Status: Published

Published Date: 2024-02-16

Peer Reviewed: Yes

URL: <http://dx.doi.org/10.3389/feart.2024.1354080>

Title: Charcoal analysis for temperature reconstruction with infrared spectroscopy

Abstract:

The duration and maximum combustion temperature of vegetation fires are important fire properties with implications for ecology, hydrology, hazard potential, and many other processes. Directly measuring maximum combustion temperature during vegetation fires is difficult. However, chemical transformations associated with temperature are reflected in the chemical properties of charcoals (a by-product of fire). Therefore, charcoal could be used indirectly to determine the maximum combustion temperature of vegetation fires with application to palaeoecological charcoal records. To evaluate the reliability of charcoal chemistry as an indicator of maximum combustion temperature, we studied the chemical properties of charcoal formed through two laboratory methods at measured temperatures. Using a muffle furnace, we generated charcoal from the woody material of ten different tree and shrub species at seven distinct peak temperatures (from 200°C to 800°C in 100°C increments). Additionally, we simulated more natural combustion conditions by burning woody material and leaves of four tree species in a combustion facility instrumented with thermocouples, including thermocouples inside and outside of tree branches. Charcoal samples generated in these controlled settings were analyzed using Fourier Transform Infrared (FTIR) spectroscopy to characterize their chemical properties. The Modern Analogue Technique (MAT) was employed on FTIR spectra of muffle furnace charcoal to assess the accuracy of inferring maximum pyrolysis temperature. The MAT model temperature matching accuracy improved from 46% for all analogues to 81% when including  $\pm 100^\circ\text{C}$ . Furthermore, we used MAT to compare charcoal created in the combustion facility with muffle furnace charcoal. Our findings indicate that the spectra of charcoals generated in a combustion facility can be accurately matched with muffle furnace-created charcoals of similar temperatures using MAT, and the accuracy improved when comparing the maximum pyrolysis temperature from muffle furnace charcoal with the maximum inner temperature of the combustion facility charcoal. This suggests that charcoal produced in a muffle furnace may be representative of the inner maximum temperatures for vegetation fire-produced charcoals.

DOI: 10.3389/feart.2024.1354080

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Attached Document: Charcoal analysis for temperature reconstruction with infrared spectroscopy.pdf

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**Title: Curriculum - Final Draft of MS Wildfire Ecology curriculum. Used in classrooms by pre-service teachers through UNR and UNLV outreach programs during the 23-24 school year. Will become available for public use on Green Box website in May 2024.**

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Title: Curriculum - Final Draft of MS Wildfire Ecology curriculum. Used in classrooms by pre-service teachers through UNR and UNLV outreach programs during the 23-24 school year. Will become available for public use on Green Box website in May 2024.

RII Support: Primary

Federal Support Acknowledged: Yes

Attached Document:

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**Title: Curriculum - First draft of HS Wildfire Ecology curriculum. Will be used in classrooms by pre-service teachers through UNR and UNLV outreach programs during the 24-25 school year. Will become available for public use on the Green Box website in May 2025.**

Report: 2024/2148788

Product Type: Other

Other Type Description: Other

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URL:

Title: Curriculum - First draft of HS Wildfire Ecology curriculum. Will be used in classrooms by pre-service teachers through UNR and UNLV outreach programs during the 24-25 school year. Will become available for public use on the Green Box website in May 2025.

RII Support: Primary

Federal Support Acknowledged: Yes

Attached Document:

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**Title: Di- Sulfur Triazole Phosphate Fire Retardants (United States Patent Application No. 63/601,377)**

Report: 2024/2148788

Product Type: Patent

Status: Pending

Patent Application Number:

Awarded Date:

Patent Number:

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Peer Reviewed: No

URL:

Title: Di- Sulfur Triazole Phosphate Fire Retardants (United States Patent Application No. 63/601,377)

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Federal Support Acknowledged: Yes

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**Title: Evaluating an Elevated Signal-to-Noise Ratio in EEG Emotion Recognition**

Report: 2024/2148788

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Peer Reviewed: Yes

URL: <http://dx.doi.org/10.4018/ijjsi.333161>

Title: Evaluating an Elevated Signal-to-Noise Ratio in EEG Emotion Recognition

Abstract:

<p>Predicting valence and arousal values from EEG signals has been a steadfast research topic within the field of affective computing or emotional AI. Although numerous valid techniques to predict valence and arousal values from EEG signals have been established and verified, the EEG data collection process itself is relatively undocumented. This creates an artificial learning curve for new researchers seeking to incorporate EEGs within their research workflow. In this article, a study is presented that illustrates the importance of a strict EEG data collection process for EEG affective computing studies. The work was evaluated by first validating the effectiveness of a machine learning prediction model on the DREAMER dataset, then showcasing the lack of effectiveness of the same machine learning prediction model on cursorily obtained EEG data.</p>

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Attached Document: Evaluating an Elevated Signal-to-Noise Ratio in EEG Emotion Recognition.  
pdf

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## **Title: Feature Collusion Attack on PMU Data-driven Event Classification**

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Title: Feature Collusion Attack on PMU Data-driven Event Classification

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Attached Document: Feature Collusion Attack on PMU Data-driven Event Classification.pdf

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## **Title: Framework for Monitoring Post-fire Vegetation Dynamics: Insights from Carpenter-1 Wildfire**

Report: 2024/2148788

Product Type: Journal Article

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URL:

Title: Framework for Monitoring Post-fire Vegetation Dynamics: Insights from Carpenter-1 Wildfire

RII Support: Primary

Federal Support Acknowledged: Yes

Attached Document: Framework for Monitoring Post-fire Vegetation Dynamics Insights from Carpenter-1 Wildfire.pdf

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**Title: Harnessing the Fire Revolution for Fire Science (HDRFS) Website**

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Title: Harnessing the Fire Revolution for Fire Science (HDRFS) Website

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**Title: Hyperspectral Reflectance and Chemical Composition of Pre- and Post-Fire Soils from Three 2021 Western USA Megafires**

Report: 2024/2148788

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Published Status: Published

Published Date: 2023-12-14

Peer Reviewed: Yes

URL: <http://dx.doi.org/10.3390/fire6120471>

Title: Hyperspectral Reflectance and Chemical Composition of Pre- and Post-Fire Soils from Three 2021 Western USA Megafires

Abstract:

Over the past two decades, wildfire activity in the western USA has increased, especially in California. Wildfires not only affect air quality but also the environment at large, including chemical and physical properties of fire-affected soils, which are of great interest for prediction and mitigation of hydrological consequences. Hyperspectral reflectance can be used to remotely assess the effects of fires on soil and here we use it to characterize soils before and after three 2021 California wildfires (Dixie, Beckwourth Complex, and Caldor fire). We acquired reflectance spectra and compared changes in these spectra with changes in the chemistry of analyzed soils. For all three fires, the results show that 700 nm wavelength reflectance of ash samples collected 1 and 1.5 years after fire decreased between 36% and 76% compared to that of samples collected right after the fires. Additionally, significantly higher visible reflectance has been found for unburned compared to burned soil samples in each region that was studied. Infrared transmission measurements were used to characterize the carbonate content of soil and ash samples demonstrating a mostly positive relationship between carbonate content and visible reflectance, indicating a possible cause and effect between the two.

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Publisher: MDPI AG

Journal: Fire

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RII Support: Partial

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Attached Document: Hyperspectral Reflectance and Chemical Composition of Pre- and Post-Fire Soils from Three 2021 Western USA Megafires.pdf

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## **Title: Integrating LSTM and EEMD Methods to Improve Significant Wave Height Prediction**

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Title: Integrating LSTM and EEMD Methods to Improve Significant Wave Height Prediction

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Attached Document: Integrating LSTM and EEMD methods to improve significant wave height prediction.pdf

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## **Title: Machine Learning-Based Land Cover Classification and Impact Assessment in Pre-wildfire and Post-wildfire Areas**

Report: 2024/2148788

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Title: Machine Learning-Based Land Cover Classification and Impact Assessment in Pre-wildfire and Post-wildfire Areas

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Attached Document: Machine Learning-Based Land Cover Classification and Impact Assessment in Pre-wildfire and Post-wildfire Areas.pdf

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# **Title: Modification of Soil Hydroscopic and Chemical Properties Caused by Four Recent California, USA Megafires**

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Product Type: Journal Article

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Published Date: 2023-05-03

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URL: <http://dx.doi.org/10.3390/fire6050186>

Title: Modification of Soil Hydroscopic and Chemical Properties Caused by Four Recent California, USA Megafires

Abstract:

While it is well known that wildfires can greatly contribute to soil water repellency by changing soil chemical composition, the mechanisms of these changes are still poorly understood. In the past decade, the number, size, and intensity of wildfires have greatly increased in the western USA. Recent megafires in California (i.e., the Dixie, Beckwourth Complex, Caldor, and Mosquito fires) provided us with an opportunity to characterize pre- and post-fire soils and to study the effects of fires on soil water repellency, soil organic constituents, and connections between the two. Water drop penetration time (WDPT) tests performed in the field showed a significant increase (from <1 s up to >600 s) in WDPT from pre- to post-fire soils. This increase in soil water repellency after fires was confirmed by increases in apparent contact angle (ACA) between 1.1 and 9 times from unburned to burned soils. The chemical characterization of burned soils with high resolution mass spectrometry showed the increased abundance of hydrophobic organics (e.g., PAH-like compounds and organic molecules with a low number of oxygen atoms) as well as the correlation of the average H/C ratio and aromaticity index (AI) with ACA. Most likely, these compounds contribute to post-fire soil water repellency that triggers hydrological effects such as landslides, flooding, and debris flows.

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Attached Document: Modification of Soil Hydroscopic and Chemical Properties Caused by Four Recent California, USA Megafires.pdf

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## **Title: Multi-Scale Transformer Pyramid Networks for Multivariate Time Series Forecasting**

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Published Date: 2024-01-23

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Title: Multi-Scale Transformer Pyramid Networks for Multivariate Time Series Forecasting

DOI: 10.1109/access.2024.3357693

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Journal: IEEE Access

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Attached Document: Multi-Scale Transformer Pyramid Networks for Multivariate Time Series Forecasting.pdf

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## **Title: NevadaNet Research & Education DMZ network and federated applications architecture**

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Published Date:

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URL:

Title: NevadaNet Research & Education DMZ network and federated applications architecture

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Attached Document:

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## **Title: Optical properties of nonspherical, light-absorbing particles: Black carbon and mineral dust aerosols**

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Published Status: Published

Published Date: 2023-05-08

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Title: Optical properties of nonspherical, light-absorbing particles: Black carbon and mineral dust aerosols

DOI: 10.1016/b978-0-323-99901-4.00005-6

Details:

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Attached Document: Optical properties of nonspherical, light-absorbing particles Black carbon and mineral dust aerosols.pdf

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## **Title: Orchestrating Apache NiFi/MiNiFi within a Spatial Data Pipeline**

Report: 2024/2148788

Product Type: Conference Proceedings Article

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Published Date: 2023-08-03

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URL: <http://dx.doi.org/10.1109/sera57763.2023.10197731>

Title: Orchestrating Apache NiFi/MiNiFi within a Spatial Data Pipeline

DOI: 10.1109/sera57763.2023.10197731

Forum Name: 2023 IEEE/ACIS 21st International Conference on Software Engineering

Research, Management and Applications (SERA)

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Publisher: IEEE

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Management and Applications (SERA)

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Federal Support Acknowledged: Yes

Attached Document: Orchestrating Apache NiFiMiNiFi within a Spatial Data Pipeline.pdf

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**Title: Presentation: Black Carbon Aerosols Properties for Remote Sensing and Radiative Forcing Applications. (41st Annual Conference of the American Association for Aerosol Research - Portland, OR)**

Report: 2024/2148788

Product Type: Other Conference Presentation/Paper

Presentation Status: Published

Presented Date:

Peer Reviewed: No

URL:

Title: Presentation: Black Carbon Aerosols Properties for Remote Sensing and Radiative Forcing Applications. (41st Annual Conference of the American Association for Aerosol Research - Portland, OR)

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Attached Document:

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**Title: Presentation: Calculation of Burn Severity Based on Physics of Wildfires. (2023 Fall Meeting of the American Geophysical Union, San Francisco, CA)**

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Title: Presentation: Calculation of Burn Severity Based on Physics of Wildfires. (2023 Fall Meeting of the American Geophysical Union, San Francisco, CA)

RII Support: Partial

Federal Support Acknowledged: Yes

Attached Document:

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Authors Imported from DOI:

**Title: Presentation: Changes in soil water repellency caused by four 2021-2022 western U.S. mega fires. (8th International Wildland Fire Conference - Porto, Portugal)**

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Title: Presentation: Changes in soil water repellency caused by four 2021-2022 western U.S. mega fires. (8th International Wildland Fire Conference - Porto, Portugal)

RII Support: Partial

Federal Support Acknowledged: Yes

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Authors Imported from DOI:

**Title: Presentation: Hyperspectral Reflectance and Chemistry of Pre- and Post-Fire Soils in the Western US (Science Talk: Desert Research Institute, Reno, NV)**

Report: 2024/2148788

Product Type: Other Conference Presentation/Paper

Presentation Status: Published

Presented Date:

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Title: Presentation: Hyperspectral Reflectance and Chemistry of Pre- and Post-Fire Soils in the Western US (Science Talk: Desert Research Institute, Reno, NV)

RII Support: Partial

Federal Support Acknowledged: Yes

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Authors Imported from DOI:

**Title: Presentation: Hyperspectral Reflectance of Pre- and Post-Fire Soils: Toward Remote Sensing of Fire-Induced Soil Hydrophobicity. (2023 Nevada Space Grant and NASA EPSCoR Statewide Meeting - Carson City, NV)**

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URL:

Title: Presentation: Hyperspectral Reflectance of Pre- and Post-Fire Soils: Toward Remote Sensing of Fire-Induced Soil Hydrophobicity. (2023 Nevada Space Grant and NASA EPSCoR Statewide Meeting - Carson City, NV)

RII Support: Partial

Federal Support Acknowledged: Yes

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Authors Imported from DOI:

**Title: Presentation: Hyperspectral Reflectance of Pre- and Post-Fire Soils: Toward Remote Sensing of Fire-Induced Soil Hydrophobicity. (20th Electromagnetic and Light Scattering Conference ELS-XX - Almuñecar, Spain)**

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URL:

Title: Presentation: Hyperspectral Reflectance of Pre- and Post-Fire Soils: Toward Remote Sensing of Fire-Induced Soil Hydrophobicity. (20th Electromagnetic and Light Scattering Conference ELS-XX - Almuñecar, Spain)

RII Support: Partial

Federal Support Acknowledged: Yes

Attached Document:

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Authors Imported from DOI:

**Title: Presentation: Hyperspectral Reflectance of Pre- and Post-Fire Soils: Toward Remote Sensing of Fire-Induced Soil Hydrophobicity. (Desert Research Institute Graduate Student Poster Competition, Reno NV)**

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Product Type: Other Conference Presentation/Paper

Presentation Status: Published

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Title: Presentation: Hyperspectral Reflectance of Pre- and Post-Fire Soils: Toward Remote Sensing of Fire-Induced Soil Hydrophobicity. (Desert Research Institute Graduate Student Poster Competition, Reno NV)

RII Support: Partial

Federal Support Acknowledged: Yes

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Authors Imported from DOI:

**Title: Presentation: Optical Properties of Black Carbon Aerosols Needed for Remote Sensing and Radiative Forcing Applications. (13th International Conference on Carbonaceous Particles in the Atmosphere (ICCPA) - Berkeley, CA)**

Report: 2024/2148788

Product Type: Other Conference Presentation/Paper

Presentation Status: Published

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URL:

Title: Presentation: Optical Properties of Black Carbon Aerosols Needed for Remote Sensing and Radiative Forcing Applications. (13th International Conference on Carbonaceous Particles in the Atmosphere (ICCPA) - Berkeley, CA)

RII Support: Partial

Federal Support Acknowledged: Yes

Attached Document:

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Authors Imported from DOI:

**Title: Presentation: RENs & NRPs Ecosystem Panel: Regional Perspective from NevadaNet. (4NRP: Fourth National Research Platform Workshop - La Jolla, CA)**

Report: 2024/2148788

Product Type: Other Conference Presentation/Paper

Presentation Status: Published

Presented Date:

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URL:

Title: Presentation: RENs & NRPs Ecosystem Panel: Regional Perspective from NevadaNet. (4NRP: Fourth National Research Platform Workshop - La Jolla, CA)

RII Support: Partial

Federal Support Acknowledged: Yes

Attached Document:

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Scotty Strachan / Nevada System of Higher Education

Authors Imported from DOI:

**Title: Presentation: Research & Education at NevadaNet: anticipating, adapting, adopting (Southwest Higher Education Knowledge and Technology Exchange - Salt Lake City, UT)**

Report: 2024/2148788

Product Type: Other Conference Presentation/Paper

Presentation Status: Published

Presented Date:

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Title: Presentation: Research & Education at NevadaNet: anticipating, adapting, adopting (Southwest Higher Education Knowledge and Technology Exchange - Salt Lake City, UT)

RII Support: Partial

Federal Support Acknowledged: Yes

Attached Document:

Contributors:

Scotty Strachan / Nevada System of Higher Education

Authors Imported from DOI:

**Title: Presentation: Spatiotemporal distribution of brown carbon and organic aerosol brownness across the U.S. chemical speciation network. (41st Annual Conference of the American Association for Aerosol Research - Portland, OR)**

Report: 2024/2148788

Product Type: Other Conference Presentation/Paper

Presentation Status: Published

Presented Date:

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URL:

Title: Presentation: Spatiotemporal distribution of brown carbon and organic aerosol brownness across the U.S. chemical speciation network. (41st Annual Conference of the American Association for Aerosol Research - Portland, OR)

RII Support: Partial

Federal Support Acknowledged: Yes

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**Title: Presentation: The Tables of Aerosol Optics (TAO) Project (2023 Fall Meeting of the American Geophysical Union - San Francisco, CA)**

Report: 2024/2148788

Product Type: Other Conference Presentation/Paper

Presentation Status: Published

Presented Date:

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URL:

Title: Presentation: The Tables of Aerosol Optics (TAO) Project (2023 Fall Meeting of the American Geophysical Union - San Francisco, CA)

RII Support: Partial

Federal Support Acknowledged: Yes

Attached Document:

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Hans Moosmüller / Desert Research Institute

Authors Imported from DOI:

**Title: Process#Based Quantification of the Role of Wildfire in Shaping Flood Frequency**

Report: 2024/2148788

Product Type: Journal Article

Published Status: Published

Published Date: 2023-12-21

Peer Reviewed: Yes

URL: <http://dx.doi.org/10.1029/2023wr035013>

Title: Process#Based Quantification of the Role of Wildfire in Shaping Flood Frequency

Abstract:

Moderate to high severity wildfire can abruptly alter watershed properties and enhance extreme hydrologic responses such as debris flows and floods. The compounding effects of wildfire on flood hazard, represented here via flood frequency analysis (FFA; e.g., 100# year flood) are of growing importance. Standard statistical FFA approaches are ill#suited to examining this issue because wildfire#affected flood peak observations are limited in number and violate the assumption of independent and identically distributed events. Here, we developed a process#based FFA framework that integrates a stochastic rainfall generator, wildfire simulation, inverse modeling, and a physics#based hydrological model to directly simulate the impacts of wildfire on FFA. We applied this framework in the upper Arroyo Seco watershed in Southern California, which experienced Moderate to high burn during the 2009 Station Fire. An FFA analysis, performed with simulated peak flows from the first year since fire demonstrates the 100#year flood can be three times larger than simulations that only consider peak flows in non#fire#affected years. On the other hand, coupling process#based FFA with stochastically simulated wildfire events and watershed's time#varying hydrologic recovery yields "fire continuum FFA", a concept introduced here for the first time. Fire continuum FFA accounts for multiple wildfires within very long synthetic time series. Variability in upper tail flood peaks is substantially higher in fire continuum results as compared with pre#wildfire FFA. This result highlights the importance of wildfire inter#arrival time and post#wildfire recovery processes, both of which are expected to change as a result of climatic change and evolving fire management strategies.

DOI: 10.1029/2023wr035013

Forum Name: Water Resources Research

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Journal: Water Resources Research

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RII Support: Partial

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Attached Document: Process#Based Quantification of the Role of Wildfire in Shaping Flood Frequency.pdf

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## **Title: The 2021 Bootleg Fire: A Hydrological Perspective through Remote Sensing and Machine Learning**

Report: 2024/2148788

Product Type: Journal Article

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Published Date:

Peer Reviewed: No

URL:

Title: The 2021 Bootleg Fire: A Hydrological Perspective through Remote Sensing and Machine Learning

RII Support: Primary

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Attached Document: The 2021 Bootleg Fire A Hydrological Perspective through Remote Sensing and Machine Learning.pdf

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## **Title: TopoCommit: A Topological Commit Protocol for Cross-Ledger Transactions in Scientific Computing**

Report: 2024/2148788

Product Type: Conference Proceedings Article

Published Status: Published

Published Date: 2023-11-21

Peer Reviewed: No

URL: <http://dx.doi.org/10.1109/cluster52292.2023.00038>

Title: TopoCommit: A Topological Commit Protocol for Cross-Ledger Transactions in Scientific Computing

DOI: 10.1109/cluster52292.2023.00038

Forum Name: 2023 IEEE International Conference on Cluster Computing (CLUSTER)

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Conference: 2023 IEEE International Conference on Cluster Computing (CLUSTER)

Event: 2023 IEEE International Conference on Cluster Computing (CLUSTER)

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Federal Support Acknowledged: Yes

Attached Document: TopoCommit A Topological Commit Protocol for Cross Ledger Transactions in Scientific Computing.pdf

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## **Title: Toward Efficient Homomorphic Encryption for Outsourced Databases through Parallel Caching**

Report: 2024/2148788

Product Type: Journal Article

Published Status: Published

Published Date: 2023-05-30

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URL: <http://dx.doi.org/10.1145/3588920>

Title: Toward Efficient Homomorphic Encryption for Outsourced Databases through Parallel Caching

Abstract:

Many applications deployed to public clouds are concerned about the confidentiality of their outsourced data, such as financial services and electronic patient records. A plausible solution to this problem is homomorphic encryption (HE), which supports certain algebraic operations directly over the ciphertexts. The downside of HE schemes is their significant, if not prohibitive, performance overhead for data-intensive workloads that are very common for outsourced databases, or database-as-a-serve in cloud computing. The objective of this work is to mitigate the performance overhead incurred by the HE module in outsourced databases. To that end, this paper proposes a radix-based parallel caching optimization for accelerating the performance of homomorphic encryption (HE) of outsourced databases in cloud computing. The key insight of the proposed optimization is caching selected radix-ciphertexts in parallel without violating existing security guarantees of the primitive/base HE scheme. We design the radix HE algorithm and apply it to both batch- and incremental-HE schemes; we demonstrate the security of those radix-based HE schemes by showing that the problem of breaking them can be reduced to the problem of breaking their base HE schemes that are known IND-CPA (i.e. Indistinguishability under Chosen-Plaintext Attack). We implement the radix-based schemes as middleware of a 10-node Cassandra cluster on CloudLab; experiments on six workloads show that the proposed caching can boost state-of-the-art HE schemes, such as Paillier and Symmetria, by up to five orders of magnitude.

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Forum Name: Proceedings of the ACM on Management of Data

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Journal: Proceedings of the ACM on Management of Data

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## **Title: Towards Distributed Learning of PMU Data: A Federated Learning based Event Classification Approach**

Report: 2024/2148788

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Published Status: Published

Published Date: 2023-09-25

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URL: <http://dx.doi.org/10.1109/pesgm52003.2023.10252920>

Title: Towards Distributed Learning of PMU Data: A Federated Learning based Event Classification Approach

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Forum Name: 2023 IEEE Power & Energy Society General Meeting (PESGM)

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Event: 2023 IEEE Power & Energy Society General Meeting (PESGM)

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Attached Document: Towards Distributed Learning of PMU Data A Federated Learning based Event Classification Approach.pdf

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## **Title: UAV-based Foliage Plant Species Classification for Semantic Characterization of Pre-Fire Landscapes**

Report: 2024/2148788

Product Type: Journal Article

Published Status: Submitted

Published Date:

Peer Reviewed: No

URL:

Title: UAV-based Foliage Plant Species Classification for Semantic Characterization of Pre-Fire Landscapes

RII Support: Partial

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Attached Document: UAV-based Foliage Plant Species Classification for Semantic Characterization of Pre-Fire Landscapes\_submitted.pdf

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## **Title: uMuVR: A Multiuser Virtual Reality and Body Presence Framework for Unity**

Report: 2024/2148788

Product Type: Journal Article

Published Status: Published

Published Date: 2023-03-01

Peer Reviewed: Yes

URL:

Title: uMuVR: A Multiuser Virtual Reality and Body Presence Framework for Unity

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Attached Document: uMuVR A Multiuser Virtual Reality and Body Presence Framework for Unity.pdf

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## **Title: vFirelib: A GPU-based fire simulation and visualization tool**

Report: 2024/2148788

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Published Date: 2023-05-30

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URL: <http://dx.doi.org/10.1016/j.softx.2023.101411>

Title: vFirelib: A GPU-based fire simulation and visualization tool

DOI: 10.1016/j.softx.2023.101411

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## **Title: Virtual Reality An Overview, and How to do Typing in VR**

Report: 2024/2148788

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Title: Virtual Reality An Overview, and How to do Typing in VR

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## **Title: Wildland Fuel Characterization Across Space and Time**

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Product Type: Book Chapter

Published Status: Published

Published Date: 2023-10-20

Peer Reviewed: No

URL: <http://dx.doi.org/10.1002/9781119757030.ch4>

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## **Title: Working Session at Great Plains Network Annual Meeting: Regional CI Coordination Best Practices**

Report: 2024/2148788

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