Editorial
Guest Editors' Introduction: Special Section on IEEE PacificVis 2023

THIS special section of the *IEEE Transactions on Visualization and Computer Graphics (IEEE TVCG)* presents the five most highly rated papers from the 2023 IEEE Pacific Visualization Symposium (IEEE PacificVis), hosted in Seoul, Korea from April 18 to Apr 21, 2023. IEEE PacificVis, sponsored by the IEEE Visualization and Graphics Technical Committee (VGTC), aims to foster greater exchange between visualization researchers and practitioners, especially in the Asia-Pacific region. This forum has grown to be a truly international event, attracting submissions and attendees from many countries, not only in the Asia-Pacific but also in Europe, America, and beyond. Thus, IEEE PacificVis is serving the additional purpose of sharing the latest advances in the field of visualization with researchers and practitioners in the region and, also, introducing research developments from the region to the broader international visualization research community.

To ensure the high quality of accepted papers, the IEEE PacificVis 2023 Papers Co-Chairs employed a two-stage peer-review process. Each paper was assigned to a primary reviewer and a secondary reviewer from our International Program Committee (IPC) of 52 members. The primary and secondary reviewers each recruited an additional external reviewer, ensuring a total of at least four reviewers per paper. The review process was single-blind for IPC members and double-blind for external reviewers. This year's submissions were outstanding, and the symposium accepted 23 full papers out of 80 complete submissions. In cooperation with *IEEE TVCG*, the guest editors, who were Papers Co-Chairs for the symposium, selected and recommended five outstanding papers to *IEEE TVCG* based on the first round of reviews. These five papers, representing the most highly rated of the IEEE PacificVis 2023 full paper program, were accepted directly to *IEEE TVCG* after the authors revised the original manuscripts as required by the minor revision criteria. We give a brief overview of these five papers as follows.

Two of the selected papers are related to visual queries. In "SDRQuerier: A Visual Querying Framework for Cross-National Survey Data Recycling", the authors address the limitations of public opinion surveys as a tool for studying attitudes and behaviors due to partial geographic and time coverage. In the past, social scientists turned to ex-post harmonization of variables from datasets covering similar topics in different populations and years. However, existing data portals offer little guidance to explore in-depth or query data with user-customized needs. The paper proposes SDRQuerier, a system that provides customized data queries through research questions or keywords, a new visual design that showcases the availability of harmonized data at different levels, and discloses underlying relational patterns among variables in the database to help social scientists evaluate their regression models. In "Federated Visualization: A Privacy-preserving Strategy for Aggregated Visual Query", the authors developed an innovative method to protect privacy while aggregating visual queries from decentralized data. Their approach involves mimicking the flowchart of the federated learning framework and reformulating the visualization process within a federated infrastructure. The visualization federation is achieved by utilizing a shared global module that combines the encrypted externalizations of transformed visual features of data pieces in local modules. The results and an expert review demonstrate the effectiveness of the approach.

In information visualization, linear diagrams are often used to visualize set systems by depicting set memberships as horizontal line segments in a matrix, where each set is represented as a row and each element as a column. As each set occupies its own row in the matrix, the total height of the resulting visualization is the number of sets in the instance, which can be quite large. To alleviate the sparsity and improve space utilization, "LinSets.zip: Compressing Linear Set Diagrams" presented an approach that achieves a more space-efficient representation of linear diagrams. The authors implemented the different steps of the approach in a visualization pipeline using integer-linear programming, and suitable heuristics aiming at sufficiently fast computations in practice. A quantitative evaluation and a small-scale user experiment were performed to compare the effects of compressing linear diagrams on task accuracy and task completion time for basic set- and element-based tasks, which showed that the task accuracy and task completion time for the proposed approach is on par with linear diagrams.

The paper "FraudAuditor: A Visual Analytics Approach for Collusive Fraud in Health Insurance" attempts to help in tackling collusive fraud cases in health insurance funds. Due to high similarity of fraudulent behaviors to normal medical visits and the lack of labeled data, existing statistical and machine learning-based methods have limited ability to detect such frauds. The authors proposed FraudAuditor, a three-stage visual analytics approach. The system allows users to construct a co-visit network to model the visit relationships of different patients. It further designed an improved community detection algorithm that considers the strength of fraud likelihood to detect suspicious

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fraudulent groups. The visual interface of the system allows users to investigate and verify suspicious patient behavior. The authors conducted case studies in a real-world healthcare scenario. The results and expert feedback proved the effectiveness and usability of the approach.

The paper "How Does Attention Work in Vision Transformers? A Visual Analytics Attempt" aims at explaining how Vision Transformers (ViTs) work, including the relative importance of different attention heads, the strength of individual patches attending to their spatial neighbors in different heads, and the attention patterns each individual head learns. The paper first identifies what heads are more important in ViTs by introducing multiple pruning-based metrics. It then profiles the spatial distribution of attention strengths between patches inside individual heads, as well as the trend of attention strengths across attention layers. Using an autoencoder-based learning approach, it summarizes all possible attention patterns that individual heads could learn. Examining the attention strengths and patterns of the important heads, it answers why they are important. The authors conducted case studies with experienced deep learning experts on multiple ViTs, and validated the effectiveness of their solution that interprets ViTs from head importance, head attention strength, and head attention pattern.

The guest editors would like to thank Han-Wei Shen, the Editor-in-Chief of *IEEE TVCG*, for the strong support to the process of taking the best of the IEEE PacificVis 2023 papers as minor revisions to *IEEE TVCG*. We would like to further thank the *IEEE TVCG* editorial staff for their dedicated efforts and assistance in preparing this special section. We also thank the IPC and the anonymous reviewers for their thoughtful and valuable feedback that resulted in both the high-quality program for the symposium and the papers appearing in this special section. Our thanks also go to the steering committee, especially Kwan Liu Ma, for providing guidance throughout the process. We sincerely hope that readers enjoy this sample of the best papers presented at IEEE PacificVis 2023 and consider submitting your work to the IEEE Pacific Visualization Symposium in the future.

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