

Trustable, Reproducible, and Intelligent Information Visualization Systems (TRI-IVIS)

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Abstract

TRI-IVIS focuses on Trustable, Reproducible and Intelligent Information Visualization Systems, aiming to advance methods and systems for managing and analyzing large-scale complex data, integrating Artificial Intelligence, Machine Learning, Big Data analytics, and advanced visual interfaces. While many domains may benefit from such characteristics, preferred domains for the workshop include, but are not limited to, genomic applications and Meetings, Incentives, Conferences, and Events (MICE). Many topics revolve around these domains, including heterogeneous large-scale data, distributed storage, multi-stakeholder scenarios, and regulatory requirements.

Keywords

Information visualization, Intelligent interfaces, Responsible design, Health, Well-being, Self-actualization

1. Introduction

The Trustable, Reproducible, and Intelligent Information Visualization Systems (TRI-IVIS) workshop focuses on a research line related to trust, reproducibility, regulatory compliance, and advanced visualization analytics in data-intensive environments. Such research tries to advance methods and systems for managing, computing, and analyzing large-scale and complex data by integrating Artificial Intelligence (AI), Machine Learning (ML), Big Data analytics, and advanced visual interfaces in a principled and transparent manner.

Such methods and systems are built upon the conceptual foundations established by the previously introduced AI2VIS4BigData Reference Model, mainly focused on a structured framework for coupling AI-driven analytics with interactive visualizations, with particular emphasis on explainability, traceability, and trustworthy data exploration—key prerequisites for reproducible and regulation-aware information systems [1]. An exemplar focus of this workshop edition has been on genomic applications for AI-supported laboratory diagnostics. This domain is particularly suitable as it concentrates many of the workshop's core challenges, including highly heterogeneous and large-scale data, long-term and distributed data storage, multi-stakeholder usage scenarios, knowledge discovery, user perception, ethical constraints, and regulatory requirements. At the same time, the workshop explicitly encourages cross-domain transfer of methods and models.

The target audience is mainly composed of researchers and practitioners working in Artificial Intelligence and Machine Learning, Big Data analysis, and Information Visualization Systems; The application domains are characterized by large-scale, heterogeneous, and semantically rich data that must be interpreted and communicated in a trustworthy and reproducible manner, including healthcare, life sciences, digital humanities, digital hermeneutics, scientific publications as well as meetings, incentives, conferences and events (MICE) management services. Contributions from related disciplines

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have also been strongly encouraged, as well as the participation from the genomic and bioinformatics communities, as a continuation of the IEEE BIBM 2025 Workshop on Genomic Foundation Models for Diagnostic Innovation [2], while broadening its scope toward visual analytics, AI-enabled decision support, reproducibility, and cross-domain regulatory-aware information management.

2. Topics of interest

This edition of the workshop particularly welcomed contributions addressing the integration of Artificial Intelligence, Machine Learning, Big Data analytics, and interactive visualization within transparent, explainable, and regulation-aware information systems. Taking into account the AI2VIS4BigData reference model and its emphasis on explainability, traceability, and reproducibility, the workshop has focused on architectures and methodologies supporting trustworthy visual analytics in heterogeneous and large-scale data environments, with particular attention to regulated domains such as healthcare, genomics, telehealth, digital humanities, and MICE management services.

The edition aimed at considering contributions from: Cloud Resources into Service-oriented Big Data Analysis and Information Visualization Architectures; Information Extraction and Organization into Big Data; Analysis and Information Visualization Applications Regulatory Compliance Approaches into Big Data Analysis and Information Visualization Systems, particularly in medical, genomic, and other regulated domains; Trust Mechanisms into Machine Learning and Artificial Intelligence support within Big Data Analysis and Information Visualization Applications.

These topics reflect the workshop's emphasis on developing intelligent visualization systems capable of supporting decision-making in complex, data-intensive, and multi-stakeholder environments. Particular attention was given to lifecycle-oriented architectures, explainable AI, symbiotic human-AI interaction, and knowledge-driven visual analytics.

3. Contributions

TRI-IVIS received a rich set of submissions from which 13 papers were accepted for publication. Each paper proposed a different perspective on the topics of the workshop and collectively covered three thematic clusters reflecting the TRI-IVIS focus on trustworthy, reproducible, and intelligent information visualization systems: (1) *Genomic and Medical AI Systems*, (2) *Knowledge Modeling and Information Extraction Architectures*, and (3) *Trustworthy AI and Big Data Visualization Foundations*.

Four contributions addressed the **Genomic and Medical AI Systems** domain, focusing on explainability, symbiotic AI, and regulatory-aware knowledge modeling in medical and genomic environments. **Greco et al.** propose a Symbiotic AI [3] approach for trustworthy and interactive microbiome data interpretation [4]. Their system integrates Large Language Models with visualization-based microbiome analytics and supports human-in-the-loop interaction for refining explanations within a trustworthy pipeline aligned with AI2VIS4BigData principles. **Pethke et al.** present a differentiated conceptual model for SNP-related genomic knowledge [5]. The authors introduce the Genomic Knowledge Unit called (GeKoU) for integrating structured genomic databases, inferred model predictions, and narrative biomedical evidence into regulated diagnostic workflows. **Esposito et al.** focuses on the concept of GenXAI, a system architecture for symbiotic genomic diagnostics [6], in order to combine Genomic Language Models (GLMs) with Explainable AI (XAI) and extend the Human-Centered Artificial Intelligence (HCAI) approaches in the health domain [7] to develop visual interfaces to support explanation-driven interventions and human-AI co-evolution. **Duttenhöfer et al.** revolves around medically and legally sufficient documentation of medical decision-making [8]. The authors propose a structured argumentation model based on RDF and graph-based visualization supporting transparent and legally defensible medical reasoning.

Four contributions covered **Trustworthy AI and Big Data Visualization Foundations**, specifically lifecycle-oriented architectures and trust modeling. **Bruchhaus et al.** implement a trustworthiness model in a Big Data analytics pipeline for construction risk forecasting, integrating validity, capability,

and reproducibility dimensions into visual analytics workflows [9]. **Wagenpfeil and Chernikov** propose a reference implementation integrating multimedia retrieval, Retrieval-Augmented Generation, and local LLMs in high-security environments, ensuring privacy-preserving and regulatory-compliant AI-supported visualization systems [10]. In a complementary contribution, **Wagenpfeil et al.** introduce a C2PA and eIDAS 2.0-based framework for cryptographically verifiable multimedia provenance and legally compliant content verification [11]. **Maier et al.** propose a time-stratified architecture for real-time multimodal behavioral signal analysis in telehealth, separating reactive, reflective, and asynchronous processing layers to support trustworthy visualization workflows [12].

Five contributions address **Knowledge Modeling and Information Extraction Architectures**, focusing on life-cycle oriented knowledge management and intelligent information systems. **Eichhorn et al.** present a transformer-based expert-finding framework supporting reviewer assignment and conference planning using semantic embeddings and vector-based retrieval [13]. **Hartmann et al.** propose a knowledge-graph-based expert-finding system integrating topic modeling and semantic organization to support transparent conference management workflows [14]. **Kouakam et al.** introduce a lifecycle-oriented model for cloud-based information extraction from heterogeneous MICE content [15]. Their IELC4AS2P framework supports continuous multi-source ingestion, extraction, and KPI-based decision-making to support Professional Congress Organizers by transforming heterogeneous MICE data into decision-relevant knowledge assets. **Nguyen et al.** propose an intelligent Scientific Publication Management System integrating NLP preprocessing, knowledge modeling, and AI-assisted review agents to support reviewer assignment and publication workflow optimization [16]. **Mix et al.** present a microservice-based architecture for modular digital hermeneutics, enabling lifecycle-aligned knowledge processing across heterogeneous research materials [17].

The contributions demonstrate the breadth of TRI-IVIS 2026, covering trustworthy AI architectures, lifecycle-oriented knowledge systems, explainable AI, and domain-specific intelligent visualization systems across genomics, telehealth, and MICE environments.

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Declaration on Generative AI

During the preparation of this work, the author(s) used Grammarly to perform Grammar and spelling checks. After using this service, the authors reviewed and edited the content as needed and take full responsibility for the publication's content.

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