2022 ChinaVis

ChinaVis 2022
第九届中国可视化与可视分析大会
The 9th China Visualization and Visual Analytics Conference

Visualization and Visual Analysis of Multimedia Data in Manufacturing: A Survey

王云超 朱子昊 王磊 梁荣华 孙国道

浙江工业大学

背景介绍

Industry 4.0

Smart Manufacturing

制造业可视化相关综述

A survey of visualization for smart manufacturing [JOV, 2019]

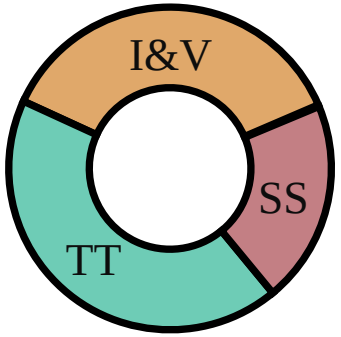
* Zhou F, Lin X, Liu C, et al. A survey of visualization for smart manufacturing[J]. Journal of Visualization, 2019, 22(2): 419-435.

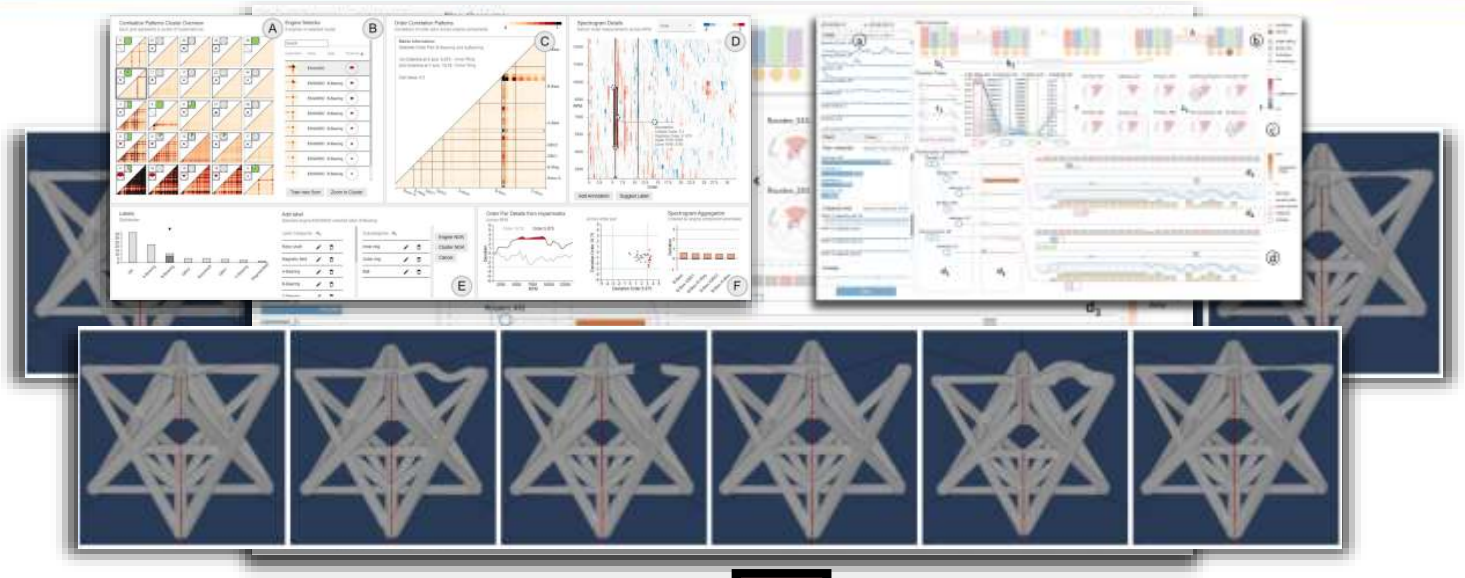
Manufacturing big data ecosystem: A systematic literature review [RCIM, 2020]

* Cui Y, Kara S, Chan K C. Manufacturing big data ecosystem: A systematic literature review[J]. Robotics and computer-integrated Manufacturing, 2020, 62: 101861.

Reflections on Visualization Research Projects in the Manufacturing Industry [CG&A, 2022]

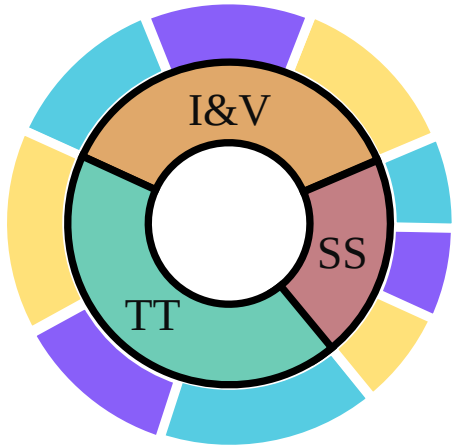
* Cibulski L, Schmidt J, Aigner W. Reflections on Visualization Research Projects in the Manufacturing Industry[J]. IEEE Computer Graphics and Applications, 2022, 42(2): 21-32.





Data type

- Signal Sensing Data (SS)
- Image & Video Data (I&V)
- Tabular Text Data (TT)



Signal Sensing Data (SS)

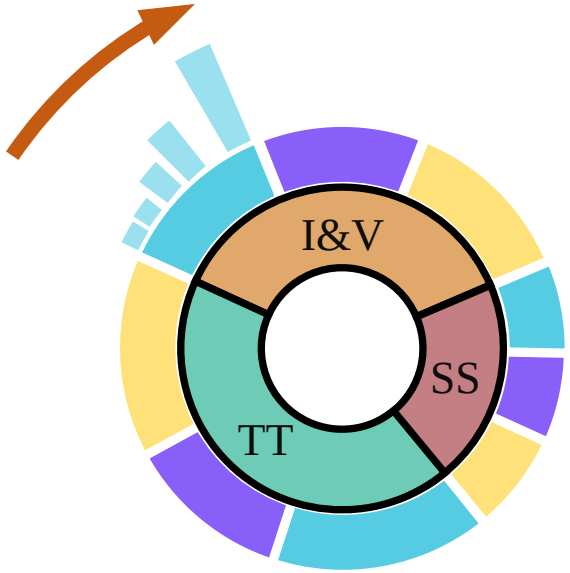
Image & Video Data (I&V)

Tabular Text Data (TT)

Visualization techniques

Interactive analysis methods

Application areas



Visualization techniques

- ***Sequence***
- ***Graph***
- ***Text***
- ***Chart***
- ***Glyph***
- ***Volume***

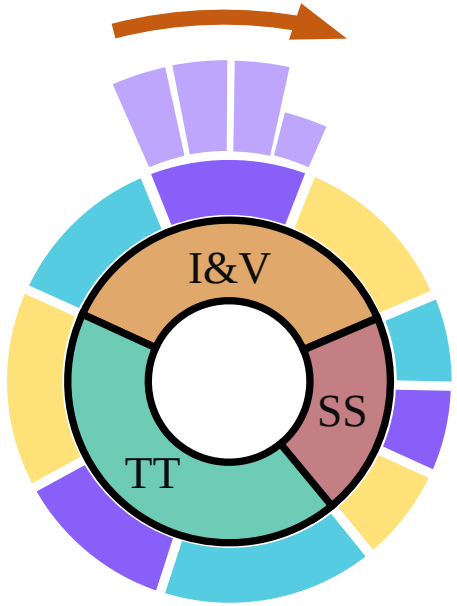
Signal Sensing Data (SS)

Image & Video Data (I&V)

Tabular Text Data (TT)

Interactive analysis methods

Application areas



Interactive analysis methods

- ***Tracking & Monitoring***
- ***Exploration & Navigation***
- ***Knowledge Externalization***
- ***Refinement & Identification***

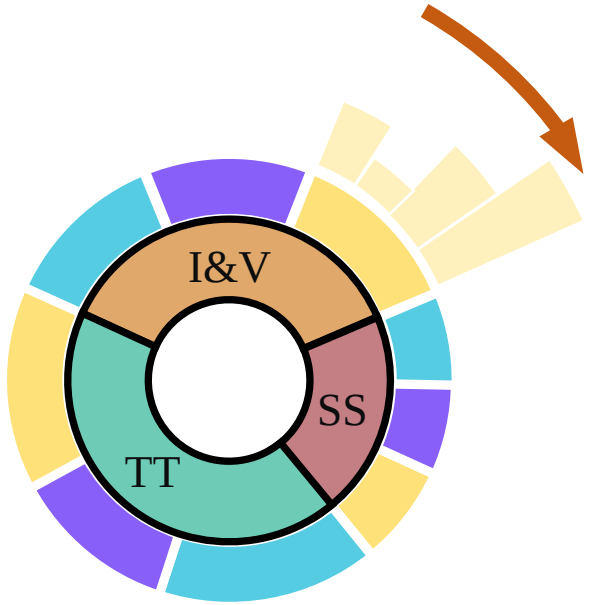
Signal Sensing Data (SS)

Image & Video Data (I&V)

Tabular Text Data (TT)

Visualization techniques

Application areas

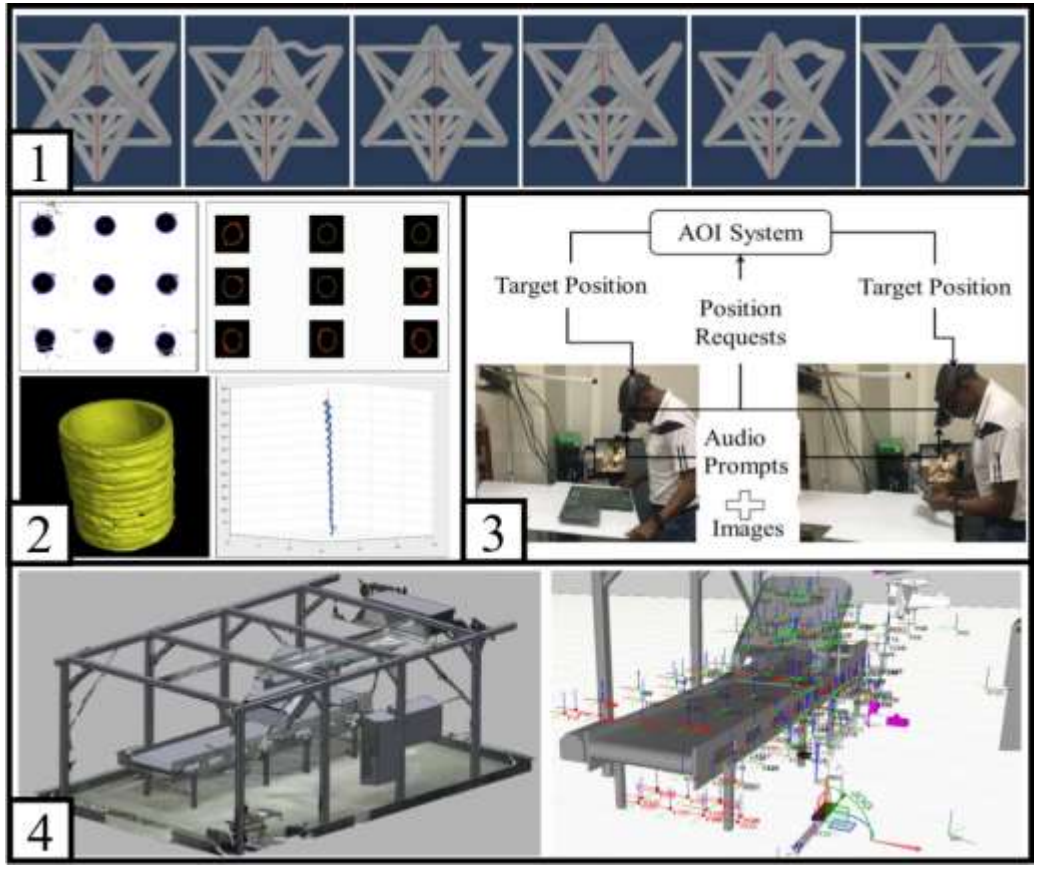


Application areas

- ***Production & Testing***
- ***Education & Training***
- ***Design & Development***
- ***Analysis & Feedback***

- Signal Sensing Data (SS)
- Image & Video Data (I&V)
- Tabular Text Data (TT)

- **Visualization techniques**
- **Interactive analysis methods**

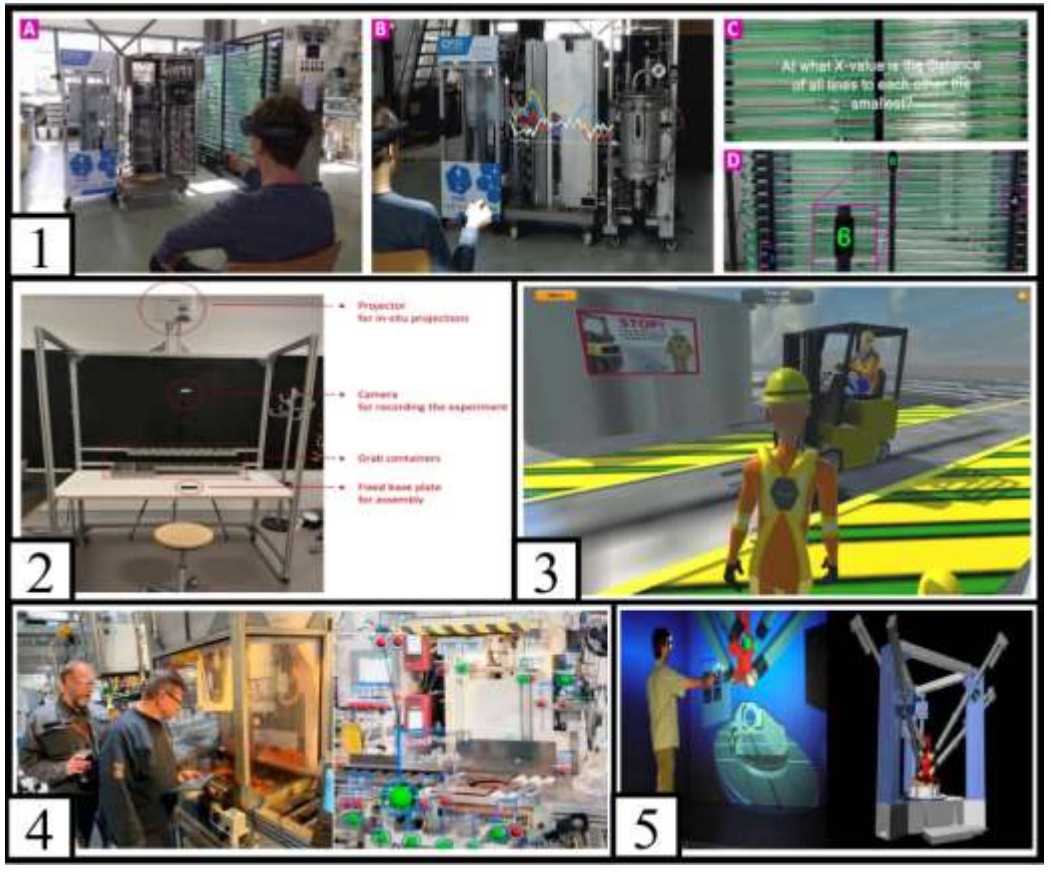


[1] Klacansky P, Miao H, Gyulassy A, et al. Virtual Inspection of Additively Manufactured Parts[C]//2022 IEEE 15th Pacific Visualization Symposium (PacificVis). IEEE, 2022: 81-90.

[2] Tao W, Xu Y, Liu H, et al. Machining accuracy detection of PCB hole by X-ray micro-CT[J]. Micron, 2020, 131: 102826.

[3] Runji J M, Lin C Y. Markerless cooperative augmented reality-based smart manufacturing double-check system: Case of safe PCBA inspection following automatic optical inspection[J]. Robotics and Computer-Integrated Manufacturing, 2020, 64: 101957.

[4] Giske L A L, Benjaminsen T, Mork O J, et al. Visualization Support for Design of Manufacturing Systems and Prototypes–Lessons Learned from Two Case Studies[J]. Procedia CIRP, 2019, 81: 512-517.



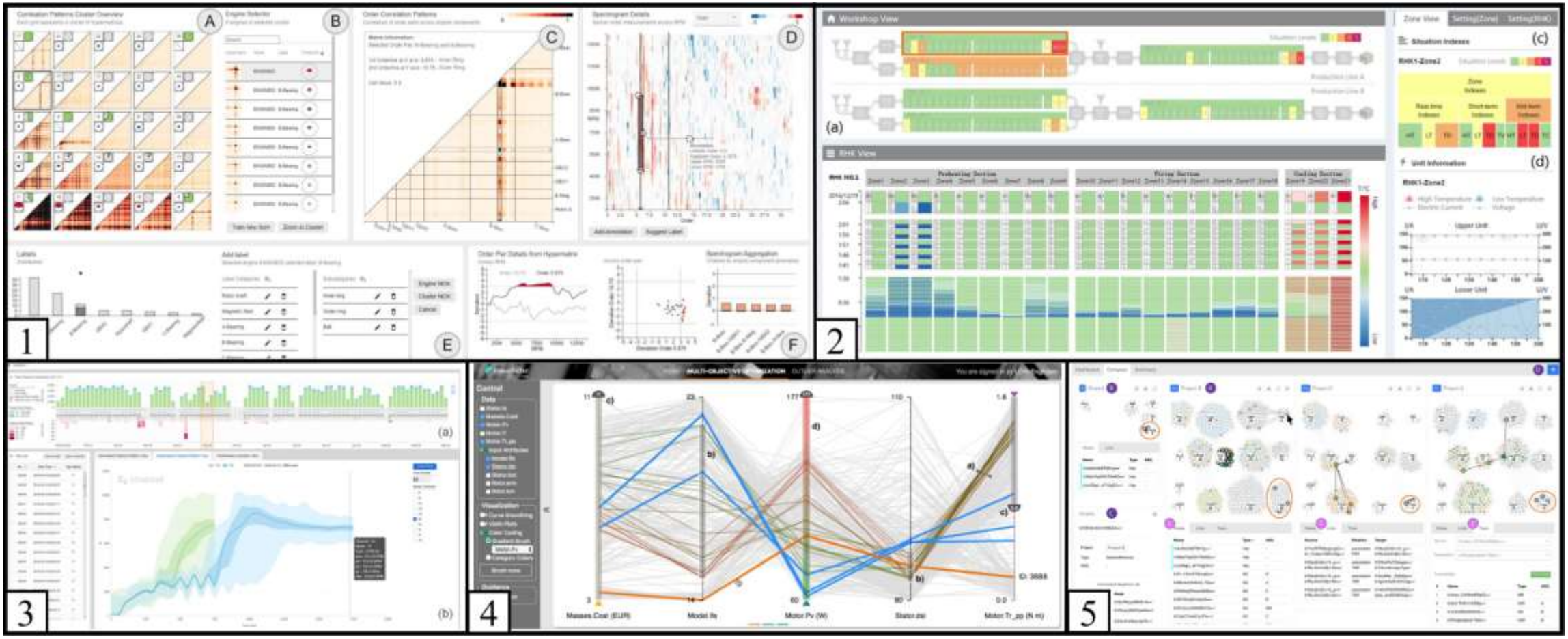
[1] Satkowski M, Dachselt R. Investigating the Impact of Real-World Environments on the Perception of 2D Visualizations in Augmented Reality[C]//Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems. 2021: 1-15.

[2] Büttner S, Prilla M, Röcker C. Augmented Reality Training for Industrial Assembly Work-Are Projection-based AR Assistive Systems an Appropriate Tool for Assembly Training?[C]//Proceedings of the 2020 CHI conference on human factors in computing systems. 2020: 1-12.

[3] Moreland J, Toth K, Fang Y, et al. Interactive simulators for steel industry safety training[J]. steel research international, 2019, 90(4): 1800513.

[4] Rosales J, Deshpande S, Anand S. IIoT based augmented reality for factory data collection and visualization[J]. Procedia Manufacturing, 2021, 53: 618-627.

[5] Hamid N S S, Aziz F A, Azizi A. Virtual reality applications in manufacturing system[C]//2014 Science and Information Conference. IEEE, 2014: 1034-1037.



[1] Eirich J, Bonart J, Jäckle D, et al. IRVINE: A design study on analyzing correlation patterns of electrical engines[J]. IEEE Transactions on Visualization and Computer Graphics, 2021, 28(1): 11-21.

[2] Zhou F, Lin X, Luo X, et al. Visually enhanced situation awareness for complex manufacturing facility monitoring in smart factories[J]. Journal of Visual Languages & Computing, 2018, 44: 58-69.

[3] Zhao Y, Wang L, Li S, et al. A visual analysis approach for understanding durability test data of automotive products[J]. ACM Transactions on Intelligent Systems and Technology (TIST), 2019, 10(6): 1-23.

[4] Cibulski L, Mitterhofer H, May T, et al. Paved: Pareto front visualization for engineering design[C]//Computer Graphics Forum. 2020, 39(3): 405-416.

[5] Narechania A, Qamar A, Endert A. Safetylens: visual data analysis of functional safety of vehicles[J]. IEEE transactions on visualization and computer graphics, 2020, 27(2): 1688-1697.

[1] Liu C, Han Y, Jiang R, et al. Advisor: Automatic visualization answer for natural-language question on tabular data[C]//2021 IEEE 14th Pacific Visualization Symposium (PacificVis). IEEE, 2021: 11-20.

[2] Wang X, Chou J K, Chen W, et al. A utility-aware visual approach for anonymizing multi-attribute tabular data[J]. IEEE transactions on visualization and computer graphics, 2017, 24(1): 351-360.

[3] Mei H, Chen W, Wei Y, et al. Rsatree: Distribution-aware data representation of large-scale tabular datasets for flexible visual query[J]. IEEE Transactions on Visualization and Computer Graphics, 2019, 26(1): 1161-1171.

[4] Wang Y, Sun Z, Zhang H, et al. Datashot: Automatic generation of fact sheets from tabular data[J]. IEEE transactions on visualization and computer graphics, 2019, 26(1): 895-905.

[1] Gove R. Automatic narrative summarization for visualizing cyber security logs and incident reports[J]. IEEE Transactions on Visualization and Computer Graphics, 2021, 28(1): 1182-1190.

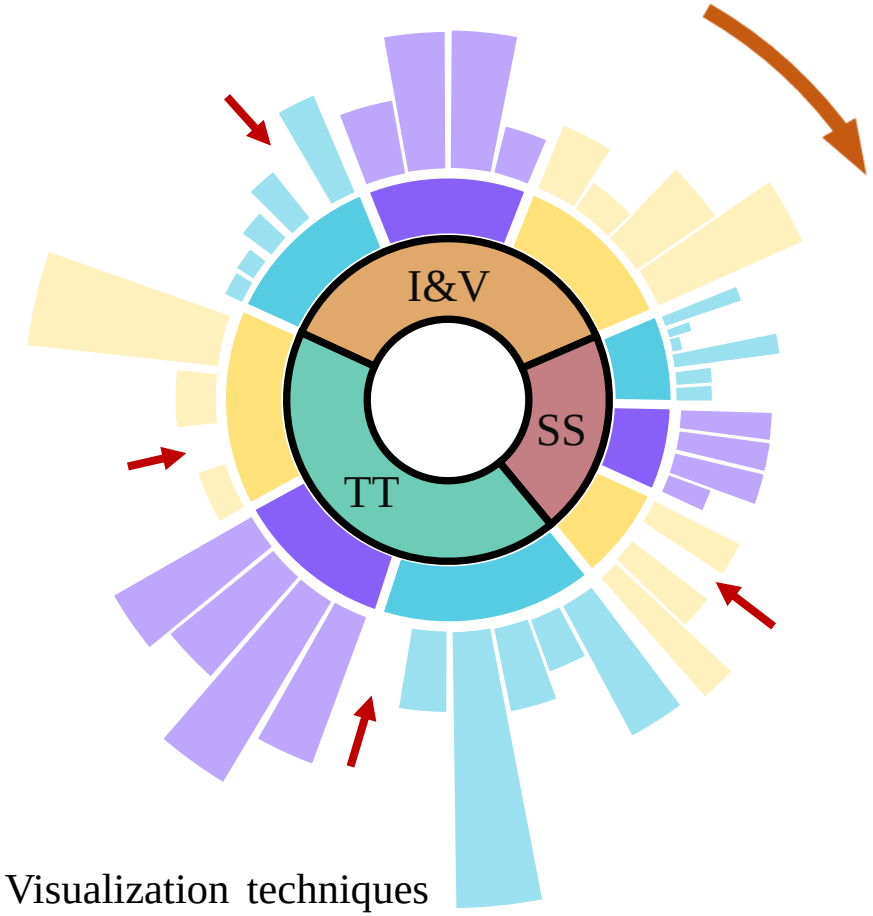
[2] Chen Y, Xu P, Ren L. Sequence synopsis: Optimize visual summary of temporal event data[J]. IEEE transactions on visualization and computer graphics, 2017, 24(1): 45-55.

[3] Fulda J, Brehmer M, Munzner T. TimeLineCurator: Interactive authoring of visual timelines from unstructured text[J]. IEEE transactions on visualization and computer graphics, 2015, 22(1): 300-309.

[4] Sun D, Huang R, Chen Y, et al. PlanningVis: A visual analytics approach to production planning in smart factories[J]. IEEE transactions on visualization and computer graphics, 2019, 26(1): 579-589.

[5] Herr D, Beck F, Ertl T. Visual analytics for decomposing temporal event series of production lines[C]//2018 22nd International conference information visualisation (IV). IEEE, 2018: 251-259.

[6] Meyer M, Beck F, Lohmann S. Visual monitoring of process runs: An application study for stored procedures[C]//2016 IEEE Pacific Visualization Symposium (PacificVis). IEEE, 2016: 160-167.



Signal Sensing Data (SS)

Image & Video Data (I&V)

Tabular Text Data (TT)

Visualization techniques

Interactive analysis methods

Application areas

总结

1、在可视化、制造业以及人机交互相关会议与期刊(TVCG, VIS, TIE, CHI...)中收集可视化与可视分析应用在制造业中的工作

2、以“数据类型”的视角，将收集到的工作分成“传感信号数据”、“图像视频数据”以及“表格文本数据”三大类

3、从“可视分析技术”、“交互分析方法”和“应用场景”三个细分类对每个数据类型中的工作进行细致阐述

展望

1、先进技术的使用

2、通用的可视分析方式和流程

3、多源多类型数据混合可视分析

Thanks
Q&A