RESEARCH ON VISUALIZATION TOOLS SELECTION FOR BUSINESS INTELLIGENCE DASHBOARDS AND REPORTS

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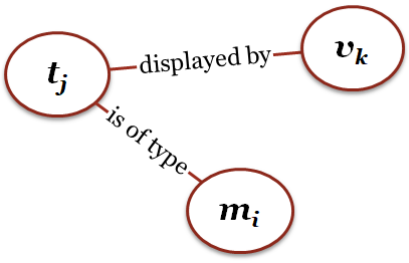
Business Intelligence (BI) dashboards and reports are used to centralize vital business information, displayed via different visual indicators in a single location (e.g., computer display, smartphone or tablet display etc.). In fact, BI dashboards are multi-layer applications, integrating data structures and business analytics techniques, used to measure, monitor, and manage organizational performance. The main BI dashboard design problem sounds like this "placing different visualization tools in a small place, while keeping them understandable." However, choosing appropriate graphs and charts is critical to solve such a problem. These widgets must reflect the nature of visualized data, in order to be easily understood by business users [1].

It is natural, that selected charts must fit data types. Hence, this study introduces the following algorithm to formalize (see Fig. 1, a) the dashboard design problem [2]:

1. Introduce the fuzzy relation between measures m_i and data types t_j:
$$\mu(m_i, t_j),\ i = 1, 2, \ldots, n,\ j = 1, 2, \ldots, p.$$
2. Introduce the fuzzy relation between data types and visualization tools v_k:
$$\mu(t_j, v_k),\ j = 1, 2, \ldots, p,\ k = 1, 2, \ldots, q.$$
3. Build the relation between measures and visualization tools:
$$\mu(m_i, v_k) = \max\{\min\{\mu(m_i, t_j), \mu(t_j, v_k)\}\},\ i = 1, 2, \ldots, n,\ k = 1, 2, \ldots, q.$$
4. Estimate the informativeness levels w_k of visualization tools (see Fig. 1, b).
5. Formulate recommendations r_i on data visualization using selected charts:
$$r_i = \arg\max_k \{w_k \cdot \mu(m_i, v_k)\},\ i = 1, 2, \ldots, n.$$

Here, n is the number of measures, p is the number of data types, and q is the number of visualization tools (i.e., graphs, charts, etc.).



(a)

Chart	Informativeness	w_i
Bar	53%	1.00
Line	46%	0.87
Bullet	25%	0.47
Scatter	23%	0.43
Sparkline	22%	0.42
Gauge	12%	0.23
Pie	10%	0.19

(b)

Picture 1 – a) dashboard design problem formalization, b) chart informativenetss levels

In the future studies, the proposed approach will be implemented as a BI system component to improve the quality of designed analytical dashboards and reports.

References:

1. Orlovskyi D., Kopp A. A business intelligence dashboard design approach to improve data analytics and decision making. *CEUR Workshop Proceedings*, 2021, 2833, pp. 48-59.

2. Kopp A., Orlovskyi D. An approach to forming dashboards for business process indicators analysis using fuzzy and semantic technologies. *CEUR Workshop Proceedings*, 2018, 2122, pp. 1-7.