Collect and Connect Data Leaves to Feature Concepts: Interactive Graph Generation Toward Wellbeing

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Abstract

Feature concepts and data leaves have been invented to foster thoughts for creating social and physical well-being through the use of datasets. The idea, simply put, is to attach selected and collected Data Leaves that are summaries of event flows to be discovered from corresponding datasets, on the target Feature Concept representing the expected scenarios of well-being individuals and well-being society. A graph of existing or expected datasets, attached in the form of Data Leaves on a Feature Concept, was generated semi-automatically. Rather than sheer automated generative AI, our work addresses the process of generative artificial and natural intelligence to create the basis for collecting and connecting useful data.

Introduction

Career, social, financial, physical, and community well-being. defined as the five factors of well-being (Rath 2010), are interrelated: social relationships via interaction among communities affect individuals' health and vice versa. The AAAI Spring Symposium in 2023 discussed the contribution of AI to these factors using various datasets (e.g. Yamano 2023). The physical one mutually supporting with the society can be regarded as the backbone of the structure of these factors, in that financial well-being originates from things we eat or use using our bodies, which enables interactions of and among communities that compose society. Here, we present a tool for visualizing a graph representing the interconnectivity of social requirements for well-being and useful datasets. We aim to federate datasets for enhancing well-being by positioning the connection of the society and physical well-beings at the core.

Feature Concept with Data Leaves

A Feature Concept (FC) is the abstraction of knowledge that is expected to be acquired from dataset(s). An FC is represented in various ways, including text, images, or logical trees (Ohsawa 2022) corresponding to user's requirement. A Data Leaf (DL) is a metadata that represents a latent event structure, including causalities that may be explained from a dataset – which can be regarded as the FC for a single dataset. The DLs are collected from a prepared DL base and connected to the FC. Coving the FC by DLs, as in Figure 1, means envisioning data for satisfying the requirement.

Visualizing a FC/DL Graph

Here, we show a FC/DL Graph including nodes representing events, actions, or datasets about them, and edges imply relations between them. A path of edges means a sequence on which the user of datasets expects to discover a sequence of actions to satisfy one's own requirement. The tool eats text T about the requirement and runs the procedure below.

See Figure 2 for the result of T about the life in COVID-19 pandemic. The blue part was created by **create_FC_graph (*T*),** and the green DLs were added to G in **Collect_connect_DLs_to_G**. Datasets on working conditions in schools, hospitals, and firms are added here. These datasets were then used to identify the factors in the social condition affecting physical well-being as in Table 1.

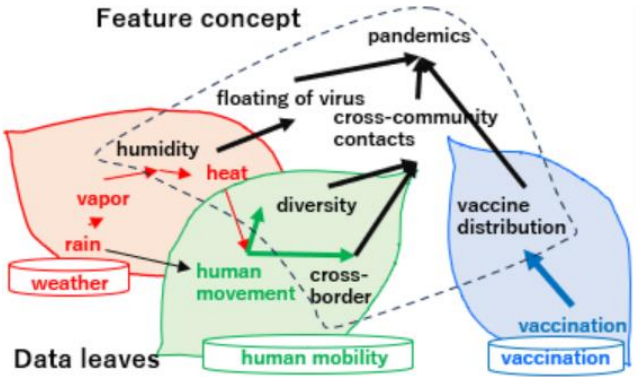

Figure 1. Feature Concept (background) and Dat Leaves (foreground leaves) attached to the FC.

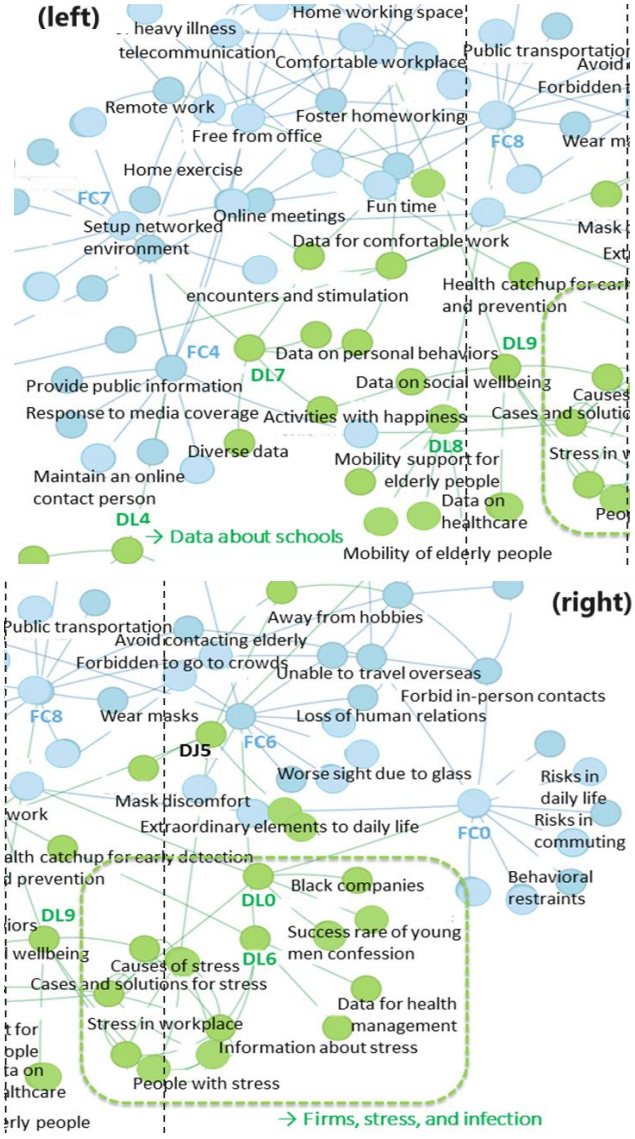

Figure 2. The left and right parts of a FC/DL graph for well-being in face of infection expansion. The common area between the two parts is between the thin dotted lines.

	(a)	(b)	(c)	(d)	(e)
COVID19	**0.76**	**0.74**	0.68	0.63	**0.74**
Chlamydia (STD)	0.6	0.57	0.54	0.53	**0.70**
Influenza	0.38	0.44	**0.51**	0.37	0.40

Table 1. Spearman's rank correlations: densities of institutes (/km^2) vs infection expansion rate (/10^4 people). The columns show the densities of (a) restaurants, (b) supermarkets, (3) high schools, (d) hospitals, and (e) listed firms

Conclusions and Future Work

This study can be regarded as an integration of evidence-based semantics (EBS: Ohsawa 2023), where the explanation of an observed event or the design of a certain function is be revised by adding new evidence, and the goal-driven abduction which contributes to broad range of sciences and their application domains (Magnani 2023). Thus obtaining new hypotheses means to reinforce generative AIs by externalizing meaningful parts linked to deep-level factors. We expect a broad range of application domains for users reasoning with common-sense knowledge.

We are applying the presented method to enhance the well-being of Yokohama City habitats using open data (Yokohama Co-creation Cons. 2023), using nodes representing FCs, DLs, and the intentions of various stakeholders in the city. Thus, we developed methods to discover new dimensions of well-being and evidence-based satisfaction. The application domain includes the contribution plan for the Noto Peninsula, suffering from the effects of the great earthquake (M7.6, D16km, > 230 victims) at the beginning of 2024, by firms and organizations in Yokohama.

Acknowledgments

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