以行動設計研究方法促進跨域知識社群之形成與演化

The Formation and Evolution of Interdisciplinary Knowledge Networks with the Action Design Research Approach

Fu-ren Lin[1] Chin-hsuan Su[1] Jun-ming Chen[2]

[1]Institute of Service Science & Regional Innovation Center
[2]Regional Innovation Center
National Tsing Hua University E-
mail: frlin@iss.nthu.edu.tw

We have completed labeling and verification of the relationship between NTHU professors' research and SDGs in the prior research. This project is based on optimizing the SDGs labeling system. It applied the action design research (ADR) method with the human-AI collaboration to introducing SDGs to NTHU. The ADR consists of four stages of actions: diagnosis, design, implementation, and evolution.

In the prior project, after confirming the link between the labeled research results and the SDGs, we produced a machine learning training database that gathered the validation from professors. Take the Word2vec model as the input of the LSTM (Long Short-Term Memory) embedding layer, and then train the multi-label classifier in a 10-folded cross validation. The accuracy rate is 91%.

With the results of automatic labeling and reconfirmation by the professors, the following values have been created:

1. Continue to improve the accuracy of prediction model.
2. The labeled results can be used as the research results and presentation of the sustainability development annual report.
3. Develop a cross-domain knowledge community under the common goal of SDGs.

Therefore, in the this proejct, we need to consider the "continuous availability" of the prediction model. In the future, more innovative researches will need to be annotated by SDGs Robot. If the model cannot keep up with the times, it may not interpret the words of new research, making the prediction results biased or unreferenced.

The human-AI collaboration allowed the model to be "continuously available" by taking professor-validated and corrected linked data. Used it as training data to retrain the model by reinforcement learning. In the human sense, this means that new human perspectives can be re-learned by the machine. It can integrate new external perspectives with the old ones to provide more informative predictions to humans.
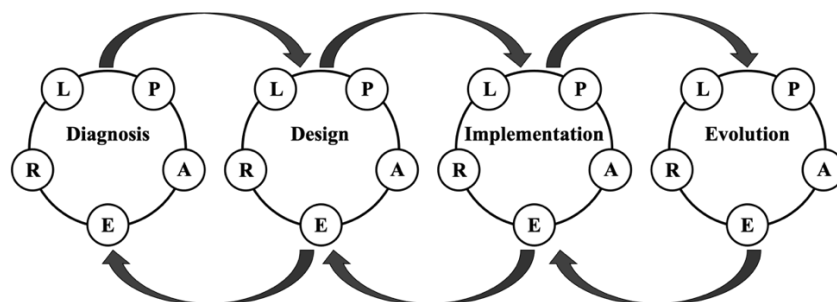
Figure 1. The four stage ADR model proposed by Mullarkey & Hevner (2019)
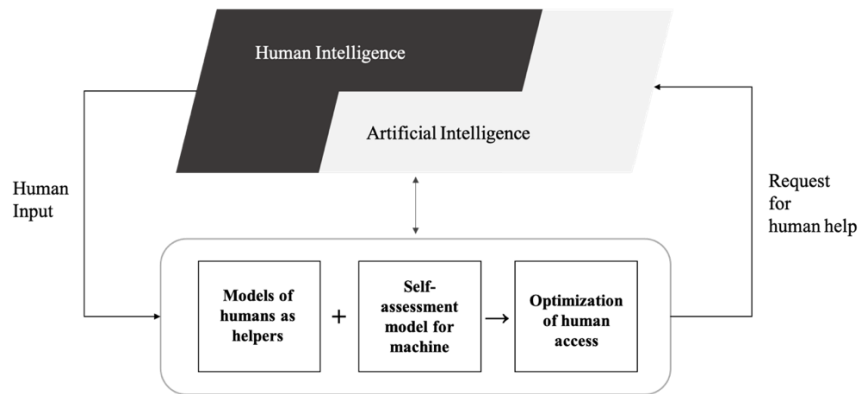
Figure 2. Reasoning capabilities for hybrid intelligence (Kamar, 2016, July)

In the first task, the SDGs research labeling system was implemented to invoke faculty awareness of SDGs. Then, we reported the labeling system and the results of our efforts to the university administration meeting. On the meeting, the university president gave a strong support to engaging faculty and students with SDGs. In the second task, the SDGs team developed the NTHU Sustainability Website to assist in SDGs Week data collection and create a unified system for uploading data from all units. The chief sustainability officers (CSOs) played the key role in driving the SDGs-related activities in the university. In the third task, we decentralized the upload process and management authority. We developed a website for each unit's SDGs, providing them with the ability to customize the projects they want to present. Because of this real-time and free-form design, the university could easily take the updated information to assess and reflect the progress of the university sustainability.
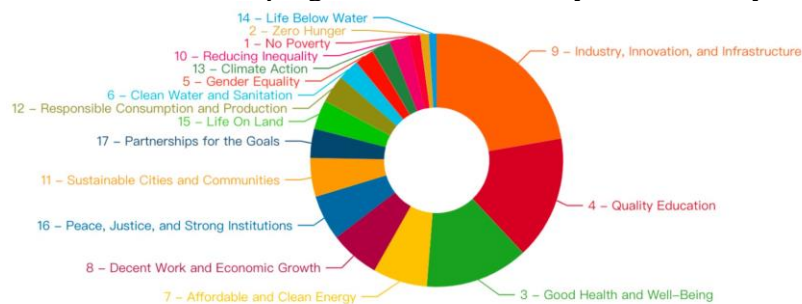
Figure 3. The research pre-labeled by SDGs Robot

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