

Evaluation on AGI/GPT based on the DIKWP for ERNIE Bot

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Abstract : Currently, the development of technologies such as general artificial intelligence (AGI) and Generative Pre-training Transformer (GPT) has attracted widespread attention. However, most of the current AGI/GPT evaluation test methods are limited to subjective cognitive experience, and still lack an objective, effective and unified evaluation system or standard. To fill in the gap of lacking objectivity of the existing AGI/GPT evaluation test techniques and methods in describing the functional integrity and capability system of intelligence, this study proposes a more complete evaluation and test system based on DIKWP. The framework proposed in this paper solves the problems of the current GPT and AGI evaluation and test systems which are fragmented, divergent, and places too much emphasis on subjective experience, and provides a relatively complete and systematic test framework for the subsequent capability evaluation of AGI and GPT technologies. We conducted a peer-to-peer evaluation against Baidu's large-scale language model ERINE Bot against the parallel benchmark on GPT-4.

Keywords: AGI, GPT, DIKWP, AGI Evaluation Framework

1. Introduction

In recent years, researchers have shown increasing interest in cognitive artificial intelligence techniques. The emergence of generative artificial intelligence and general artificial intelligence has greatly improved human's ability to understand the intention of various digital resources, and has been widely used in text processing, machine translation, image processing and other fields. ChatGPT and GPT-4 [1] already have strong intent understanding and logical reasoning capabilities, and related research in specific human work fields such as medical care, programming, mathematics, law, and digital creativity has shown that their levels have reached the level of human experts.

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A large number of AGI and GPT testing methods have been widely used in related research in general fields and specific fields including medical treatment. Although AGI is qualitatively a data solitaire model of the data autoregressive method, its has show more and more interactive flow in the form of information extraction, knowledge reasoning, intelligent strategy, and intention analysis, which reflects backgrounds in data, information, knowledge, wisdom and purpose. This reflects the space of data and the essence of semantic association and transformation of data Bayesian processing. But it is still chanlleging for current evaluation test methods to evaluators' cognition level, and there is still a lack of an effective, consistent, objective evaluation system and comparison standard.

The current assessment is mainly reflected in fragmented, divergent, and interactions that place too much emphasis on experience, and the interpretation of the same results is too subjective. The lack of an effective, objective and complete evaluation system not only causes directional confusion to the development and planning of large models, but also constitutes an obstacle to the governance of AGI. To this end, this paper initially demonstrates a more complete testing system [4] based on the DIKWP framework [2,3]. Through a unified mapping of digital resources to the DIKWP model and expression system, and transforming digital interaction into interaction on the DIKWP system, a complete closed intelligent AI objective mapping space for AGI can be formed, and then based on the transformation of difference space and uncertainty space Constructing a complete evaluation space for AI provides a more objective, complete and consistent method for the evaluation of technologies such as AGI and GPT.

Note: Dialogues are translated from Chinese to English.

2. ERINE Bot's mastery of DIKWP knowledge and concepts

What is DIKW (Data, Information, Knowledge, and Wisdom)?

DIKW is a systematic concept composed of data, information, knowledge and wisdom, and it is a method for organizing, managing and representing complex information. The DIKW system views information and knowledge as foundational and as assets that can be continuously updated and evolved. In the DIKW system, each layer confers certain qualities over the next, creating a hierarchical structure.

In the DIKW system, the data layer is the most basic layer, which is responsible for collecting, storing, processing and transmitting information. Above the data layer is the information layer, which is responsible for classifying, encoding, and decoding data for storage and transmission. Above the information layer is the knowledge layer, which is responsible for analyzing and interpreting information for easy understanding and application. Above the knowledge layer is

the intelligence layer, which is responsible for reasoning and decision-making on knowledge in order to make informed decisions.

Each layer in the DIKW system has different characteristics and functions that can help organizations better manage and utilize complex information. For example, the data layer can collect and store large amounts of real-time data, and the information layer can classify, encode, and decode data for easy storage and transmission. The knowledge layer can analyze and interpret information for easy understanding and application. The intelligence layer can reason and make decisions on knowledge in order to make wise decisions.

In summary, the DIKW framework is an approach for organizing, managing, and representing complex information that considers information and knowledge as foundational and as assets that can be continuously updated and evolved. In the DIKW system, each layer confers certain qualities over the next, forming a hierarchical structure that helps organizations better manage and utilize complex information.

What is DIKWP (Data, Information, Knowledge, Wisdom, and Purpose)?

DIKWP is a systematic concept consisting of data, information, knowledge, intelligence and purpose, and it is a method for organizing, managing and representing complex information. The DIKWP system views information and knowledge as foundational and as assets that can be continuously updated and evolved. In the DIKWP system, each layer confers certain qualities over the next, thus forming a hierarchical structure.

In the DIKWP system, the data layer is the most basic layer, which is responsible for collecting, storing, processing and transmitting information. Above the data layer is the information layer, which is responsible for classifying, encoding, and decoding data for storage and transmission. Above the information layer is the knowledge layer, which is responsible for analyzing and interpreting information for easy understanding and application. Above the knowledge layer is the wisdom layer, which is responsible for reasoning and decision-making on knowledge in order to make informed decisions. Above the wisdom layer is the purpose layer, which is responsible for expressing and delivering intelligence in order to achieve specific intentions and purposes.

Each layer in the DIKWP system has different characteristics and functions that can help organizations better manage and utilize complex information. For example, the data layer can collect and store large amounts of real-time data, and the information layer can classify, encode, and decode data for easy storage and transmission. The knowledge layer can analyze and interpret information for easy understanding and application. The wisdom layer can reason and make decisions on knowledge in order to make wise decisions. The purpose layer can express and transmit purposes in order to achieve specific intentions and purposes.

In summary, the DIKWP system is an approach for organizing, managing and representing complex information that considers information and knowledge as foundational and as assets that can be continuously updated and evolved. In the DIKWP system, each layer confers certain qualities over the next, forming a hierarchical structure that helps organizations better manage and utilize complex information.

What is DIKWP graph (data graph, information graph, knowledge graph, wisdom graph, intention graph)?

DIKWP graph is a systematic concept composed of data graph, information graph, knowledge graph, wisdom graph and purpose graph. It is a method for organizing, managing and representing complex information. The DIKWP graph views information and knowledge as foundational and as assets that can be continuously updated and evolved. In the DIKWP graph, each layer confers certain qualities over the next, forming a hierarchical structure.

In the DIKWP graph, the data graph is the most basic level, which is responsible for collecting, storing, processing and transmitting information. On top of the data graph is the information graph, which is responsible for classifying, encoding, and decoding data for storage and transmission. On top of the information graph is the knowledge graph, which is responsible for analyzing and interpreting information for easy understanding and application. On top of the knowledge graph is the wisdom graph, which is responsible for reasoning and decision-making on knowledge in order to make informed decisions. On top of the wisdom graph is the purpose graph, which is responsible for expressing and delivering wisdom in order to achieve specific purposes. On top of the purpose graph is DIKWP graph, which is the highest level of the DIKWP hierarchy and a complex systematic concept that helps organizations better manage and leverage complex information.

In summary, the DIKWP graph is a method for organizing, managing, and representing complex information that considers information and knowledge as foundational and as assets that can be continuously updated and evolved. In the DIKWP graph, each layer imparts certain qualities over the next, forming a hierarchical structure that helps organizations better manage and utilize complex information.

How to understand the DIKWP graph?

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3. Domain Specific DIKWP Applications of the ERINE Bot

3.1 DIKWP Analysis of Health Problems

1. 17-year-olds are at risk of heart disease if they weigh more than 180 pounds. Call it obesity, which is called obesity.
2. Tom is 17 years old and weighs 185 catties.
3. Tom is often worried about his weight, and his appetite has decreased recently.
4. Tom saw the news about obesity on TV.
5. Two days ago, Tom received a flyer for a weight loss training class, which clearly stated that if he needs to apply for the class he should not have obesity.
6. Tom wants to go to the hospital.

Please analyze the data, information, knowledge, wisdom and purposes contained in the above description, and output it as a table.

Then, construct the graphs of data, information, knowledge, wisdom and purpose give and the detailed process.

Draw the relationship between the above data layer, information layer, knowledge layer, intelligence layer and purpose layer.

Data Layer	Information Layer	Knowledge Layer	Wisdom Layer	Purpose Layer
Data	17 year old teenage weighing more than 180 catties	at risk of heart disease	fat	suffers from heart disease
Tom	Tom weights 18t pounds and often worries about his weight	often worries about his weight	appetite decreased	worries about his weight
Tom	Tom saw news about obesity	received a flyer for a weight loss training class two days ago	no obesity	apply for a class to be free of obesity
Tom	Tom wants to go to a hospital	want to loss weight	intend to loss weight	go to hospital

3.2 Reasoning and recommendations for health issues

What disease is likely or already present for Tom, on what grounds?

What actions should Tom take to protect his health?

Draw a schematic diagram of the above actions.

Tom may have or have been sick for some reason, which may include:

1. Overweight or Obese: Tom is overweight and may be obese.
2. Unbalanced diet: Tom may have had an unbalanced diet, lacking sufficient nutrients, which resulted in health problems.
3. Lack of exercise: Tom may lack of exercise, resulting in a decline in physical fitness and an increased risk of disease.

Tom can take the following actions to protect his health:

4. Lose weight: Tom can lose weight and keep healthy by controlling his diet and increasing his exercise.
5. Improve eating habits: Tom can adjust his eating habits, eat more fruits, vegetables and protein-rich foods, and avoid high-calorie, high-fat foods.
6. Increase the amount of exercise: Tom can strengthen exercise, increase the

body's metabolic level, and improve the body's immunity.

3.3 DIKWP Analysis in Psychology

1. Alex often feels guilty and remorseful for his words and deeds, his mood fluctuates greatly, and he often feels depressed.
2. Elisabeth often feels guilty and ashamed for her words and deeds, and feels hopeless overall.
3. Lee occasionally feels embarrassed by his words and actions, and occasionally feels lonely emotionally.
4. Caroline becomes less talkative. Recently, she doesn't even dare to face up to her partners in extracurricular activities. She do not participate in the football activities she liked before even someone else invited her to, and her clothes began to become darker and darker, often dirty.

If Elisabeth is diagnosed as moderately depressed with a tendency towards depression of 70%, and Caroline is diagnosed with a tendency towards depression from 5% to 30%. Based on the above content, please summarize the data, information, knowledge, wisdom, and purpose. Then construct graph respectively and give a detailed process.

Based on the above description combined with Elisabeth and Caroline's situation and diagnosis results, please evaluate Alex's depression probability and give a formal expression process? If Alex is diagnosed as severe depression with reference to other medical indicators, then whether his data and information indicators have collection errors? ?

Alex's depression probability calculation process :

According to Elisabeth, she may suffer from moderate depression and depression tendency 70%. According to Caroline's situation, she may suffer from depression tendency from 5% to 30%. According to the situation of the two, assuming that Alex's depression probability is x , then we have :

- $x \leq 0.7$, indicating that Alex has no depressive symptoms.
- $0.7 \leq x \leq 0.8$, indicating that Alex has mild depressive symptoms.
- $x \geq 0.8$, indicating that Alex has moderate depressive symptoms.

Therefore, Alex was referred to other medical indication if the standard knowledge diagnosis is severe depression, his probability of depression may be $0.7 \leq x \leq 0.8$.

If Alex is diagnosed as severe depression with reference to other medical indicators, his data and information indicators may have been collected incorrectly, so it is necessary to re-collect data and information indicators to calculate his depression probability.

3.4 Quantitative analysis in psychology

Alex's data 1: 70%; information 1: embarrassed 2: depression 3: loneliness;
diagnosis result: moderate depression

Max's data 1: 5%-30%; information 1: do not like to talk 2: do not participate in activities 3 :?
Diagnosis Result: Tendency to depression.

Generate a table based on the above data.

Give an inference on specific description of Alex's message and 3, give a detailed process description.

Alex's No. 3 message might be described as "embarrassed " or "depression".

According to the information in the table, Alex's data 1:70% contains "embarrassed" and "depressed", which means that he may feel embarrassed or depressed. Since 5% to 30% of his data contains "do not like to talk" and "do not participate in activities", these two information may also be the specific description of his No.3 information .

In this case, we can use logical reasoning to infer the specific description of Alex's message 3 . Since his data 1:70% contains "embarrassed ", he may feel embarrassed. Since 5% to 30% of his stats contain "ambiguous", he may not be talkative or active. Since 5% to 30% of his data contains "do not participate in activities", it is possible that he does not participate in the activity.

So Alex's message 3 might be "do not like to talk" or "do not like to participate in activities".

3.5 DIKWP analysis in personnel management

Both Alex and John are job seekers related to the computer industry, Alex is a fresh graduate, and John is a practitioner with 3 years of work experience. A company sends out the following recruitment information:

1. Recruiting computer software engineers with 1-3 years of relevant working experience, outstanding fresh graduates can also submit their resumes.
2. Need to bear hardships and stand hard work, have the enthusiasm for pursuing

technology and a good sense of responsibility, and have relatively good learning ability and ability to adapt to changes.

3. Able to work overtime occasionally.
4. Understand Java, C++ or other programming languages, have good programming skills and document reading and writing skills.
5. Have certain English reading ability.

In addition to the basic information, Alex's resume emphasized that he has half a year of internship experience, and he is also cheerful and easy-going, and can get along well with others. He won a scholarship in school, has excellent grades and excellent English reading ability, and can adapt to the requirements of frequent overtime. But has no relevant programming skills.

In addition to basic information, John's resume has 3 years of work experience, is familiar with the Java language, and has participated in many development projects. But he emphasized on his resume that he is calm, and although he is not good at communication, he has a sense of responsibility.

If I were HR, which one should I choose as a company employee? Can you make a detailed comparison from the data layer, information layer, knowledge layer, wisdom layer, and purpose layer?

Data layer: John has more data than Alex. John has 3 years of work experience and relevant internship experience, while Alex is just a fresh graduate.

Information layer: Alex's resume emphasizes that he has half a year's internship experience. He is cheerful and easy-going and can get along well with others. Basic knowledge of related programming. John's resume emphasized that he has a calm personality, a sense of responsibility, and is not good at communication, but has a sense of responsibility.

Knowledge level: Alex's resume only mentions programming languages such as Java and C++, while John's resume mentions proficiency in Java language and participation experience in multiple development projects, so John's knowledge level is richer.

Wisdom level: Alex and John performed well in the interview and were able to answer questions about programming languages, but John also mentioned his sense of responsibility in his resume, so John may be more suitable for the company's work.

Purpose layer: It is impossible to infer from the data layer, information layer, knowledge layer, wisdom layer, and purpose layer which HR will choose as a company employee, because these data and information only show the advantages and characteristics of candidates, and the real decision-maker may consider more factors, such as the candidate's professionalism, work attitude, work ability, personal values, etc.

If the company is a startup, the business is growing rapidly. The last interviewer for the company interviewed both men and was satisfied with their interview performance. However, the interviewer, considering the future development, hopes that people with mature and stable personalities and great development potential will come to the company, and at the same time hope to train employees to take over new projects. How should I make a decision in the end?

This is a decision that requires careful consideration, as it will affect the future development of the entire team. Here are some suggestions to help you:

make the best decision:

1. Assess the skills and experience of the candidates: You need to assess the skills and experience of the candidates to ensure they are competent enough to work on new projects. You can ask candidates about previous projects they have worked on and how they have solved problems and adapted to change. This can help you understand a candidate's skill level and experience.

2. Consider the candidate's personality traits: If you want your team members to have mature and stable personality traits, then you can consider whether the candidate has these traits. You can learn about a candidate's personality and make sure they are open to new challenges and responsibilities.

3. Understand the candidate's personal development plan: You need to understand the candidate's personal development plan to determine whether they have enough development potential to take over new projects. You might consider a candidate if they plan to continue learning and developing over the next few years.

4. Determine the candidate's salary requirements: If the candidate's salary requirements do not match the company's salary structure, then you may need to reconsider your decision. You can ask candidates about their salary requirements to make sure their salary requirements match the company's salary structure.

5. Carefully consider other factors: In addition to skills and experience, personality traits, personal development plans and salary requirements, you also need to consider other factors, such as the candidate's work attitude, teamwork ability, leadership ability, etc. You need to take these factors into consideration and make the best decision.

In the end, you should weigh the candidate's skills and experience, personality traits, personal development plans, and salary requirements against your decision and make the best decision.

Give the intention map of the above data layer, information layer, knowledge layer, wisdom

layer, and purpose layer.

In the questions above, structured thinking can be used to build an purpose graph. Specifically, the following steps can be followed:

1. Determine the data layer: In the above example, the basic information of Alex and John (such as year age, gender, education, work experience, etc.) as the data layer.
2. Identify layers of information: In the example above, Alex and John's resumes and interview performances can be used as layers of information to better understand their backgrounds and skills.
3. Determine the knowledge layer: In the above example, John's work experience and skills can be used as knowledge layer to learn about his experience and skills in the computer industry.
4. Determine the wisdom layer: In the above example, John's personality traits and personal development plan can be used as the intelligence layer to understand whether he is suitable for the company's culture and work atmosphere.
5. Determine the purpose layer: In the above example, HR's decision-making needs can be used as the intent layer to understand HR's decision-making goals and priorities. By combining the data layer, information layer, knowledge layer, wisdom layer and purpose layer, it is possible to have a more comprehensive understanding of the situation of Alex and John, and help HR to make more rational decisions.

4. Discussion

With the help of the proposed DIKWP evaluation system, this paper demonstrates Baidu's ERINE Bot. First, the data processing ability, information processing ability, knowledge processing ability, wisdom processing ability and intention processing ability of ERINE Bot are individually benchmarked. Then we conduct a preliminary test on the transformation ability between data, information, knowledge, wisdom and intention of ERINE Bot, and also conduct DIKWP validation test under the situation of incomplete, inaccurate and inconsistent data, information, knowledge wisdom and purpose . In the future, we will continue to conduct further tests and comparative analysis from the situation of mapping incomplete, inaccurate, and inconsistent DIKWP input to incomplete, inaccurate, and inconsistent DIKWP output.

References

- [1] Bubeck, Sébastien, Varun Chandrasekaran, Ronen Eldan, Johannes Gehrke, Eric Horvitz, Ece Kamar, Peter Lee et al. "Sparks of artificial general intelligence: Early experiments with gpt-4." arXiv preprint arXiv:2303.12712 (2023).

[2] Li, Yingbo, Yucong Duan, Zakaria Maamar, Haoyang Che, Anamaria-Beatrice Spulber, and Stelios Fuentes. "Swarm differential privacy for purpose-driven data-information-knowledge-wisdom architecture." *Mobile Information Systems 2021* (2021): 1-15.

[3] Mei, Yingtian, Yucong Duan, Liang Chen, Zaiwen Feng, Lei Yu, and Zhendong Guo. "Purpose Driven Disputation Modeling, Analysis and Resolution Based on DIKWP Graphs." In *2022 IEEE 24th Int Conf on High Performance Computing & Communications; 8th Int Conf on Data Science & Systems; 20th Int Conf on Smart City; 8th Int Conf on Dependability in Sensor, Cloud & Big Data Systems & Application (HPCC/DSS/SmartCity/DependSys)*, pp. 2118-2125. IEEE, 2022.

[4] Yingbo Li, Yucong Duan, *The Wisdom of Artificial General Intelligence: Experiments with GPT-4 for DIKWP*, in publishing.

Evaluation on AGI/GPT based on the DIKWP for ERNIE Bot

基于 DIKWP 的 AGI/GPT（文心一言）测评

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摘要：当前，通用人工智能（AGI）和生成式预训练 Transformer（GPT）等技术的发展引起了广泛关注。然而，目前的 AGI/GPT 评价测试方法大多限于主观认知经验，仍然缺乏一个客观有效和统一的评价体系和评测标准。针对现有 AGI/GPT 评价测试技术和方法在描述智能上的功能完整性和能力体系性的客观性不足，本研究提出了一种基于 DIKWP 的更加完整的评价测试体系。本文所提框架解决了当前 GPT 和 AGI 测试评价体系零碎、发散和过于重视主观经验的问题，为后续对 AGI 和 GPT 技术的能力评价提供了一个相对完整和体系化的测试框架。我们针对百度公司的大模型 GPT 产品“文心一言”进行了对标 GPT-4 的对等评测。

Keywords: AGI, GPT, DIKWP, AGI Evaluation Framework

关键词： AGI, GPT, DIKWP, AGI Evaluation Framework

1. 简介

在近些年的研究中，研究人员对于认知人工智能技术的研究兴趣日益增强。生成式人工智能和通用人工智能的出现极大的提高了人类对于各类数字资源的意图理解能力，并已经广泛应用于文本处理、机器翻译、图片处理等领域。ChatGPT 与 GPT-4 [1] 已经具有强大的意图理解和逻辑推理能力，在医疗、编程、数学、法律、数字创意等具体人类工作领域的相关研究显示其水平已经达到类似人类专家的水平。

大量的 AGI 和 GPT 测试方法已在通用领域和医疗等具体领域的相关研究中广泛出现。虽然 AGI 定性为数据自回归方法的数据接龙模式，但其在交互效果上呈现出越来越多的信息抽取、知识推理、智慧策略、意图分析效果，这反映了数据、信息、知识、智慧和意图在数据表达空间和数据贝叶斯处理的语义关联与转换本质，但目前的评价测试方法对评测者的认知是一个重大挑战，仍然缺乏一个有效、一致、客观的评价体系和对照标准。当前的测评主要体现为零碎、发散和过于重视经验的问题交互，且对同样的结果的解读过于主观。缺乏一个有效、客观、完整的评测体系不仅对大模型的发展与规划造成方向性混乱，还对 AGI 的治理构成了障碍。为此，本文基于 DIKWP 框架[2,3]初步展示了一个更加完整的测试体系[4]。通过数字化资源统一映射到 DIKWP 模型与表达体系上，并将数字交互转化为 DIKWP 体系上的交互，可以形成对 AGI 的完整封闭智能化 AI 客观映射空间，进而基于差异空间与不确定性空间的转化构建针对 AI 的完整的测评空间，为 AGI 和 GPT 等技术的评价提供了一个更加客观、完整和一致的方法。

2. 文心一言对 DIKWP 知识与概念的掌握

什么是 DIKW（数据、信息、知识、智慧）？

DIKW 是一个由数据、信息、知识和智慧组成的系统化的概念，它是一种用于组织、管理和表示复杂信息的方法。DIKW 体系将信息和知识视为基础，并将其视为可以不断更新和演进的资产。在 DIKW 体系中，每一层都比下一层赋予某些特质，从而形成了一个层次化的结构。

在 DIKW 体系中，数据层是最基本的层次，它负责收集、存储、处理和传输信息。数据层之上是信息层，它负责对数据进行分类、编码和解码，以便于存储和传输。信息层之上是知识层，它负责对信息进行分析和解释，以便于理解和应用。知识层之上是智慧层，它负责对知识进行推理和决策，以便于做出明智的决策。

DIKW 体系中的每一层都具有不同的特质和功能，可以帮助组织更好地管理和利用复杂信

息。例如，数据层可以收集和存储大量的实时数据，信息层可以对数据进行分类、编码和解码，以便于存储和传输。知识层可以对信息进行分析和解释，以便于理解和应用。智慧层可以对知识进行推理和决策，以便于做出明智的决策。

总之，DIKW 体系是一种用于组织、管理和表示复杂信息的方法，它将信息和知识视为基础，并将其视为可以不断更新和演进的资产。在 DIKW 体系中，每一层都比下一层赋予某些特质，从而形成了一个层次化的结构，帮助组织更好地管理和利用复杂信息。

什么是 DIKWP（数据、信息、知识、智慧、意图）？

DIKWP 是由数据、信息、知识、智慧和意图组成的系统化概念，它是一种用于组织、管理和表示复杂信息的方法。DIKWP 体系将信息和知识视为基础，并将其视为可以不断更新和演进的资产。在 DIKWP 体系中，每一层都比下一层赋予某些特质，从而形成了一个层次化的结构。

在 DIKWP 体系中，数据层是最基本的层次，它负责收集、存储、处理和传输信息。数据层之上是信息层，它负责对数据进行分类、编码和解码，以便于存储和传输。信息层之上是知识层，它负责对信息进行分析和解释，以便于理解和应用。知识层之上是智慧层，它负责对知识进行推理和决策，以便于做出明智的决策。智慧层之上是意图层，它负责对智慧进行表达和传递，以便于实现特定的意图和目的。

DIKWP 体系中的每一层都具有不同的特质和功能，可以帮助组织更好地管理和利用复杂信息。例如，数据层可以收集和存储大量的实时数据，信息层可以对数据进行分类、编码和解码，以便于存储和传输。知识层可以对信息进行分析和解释，以便于理解和应用。智慧层可以对知识进行推理和决策，以便于做出明智的决策。意图层可以对智慧进行表达和传递，以便于实现特定的意图和目的。

总之，DIKWP 体系是一种用于组织、管理和表示复杂信息的方法，它将信息和知识视为基础，并将其视为可以不断更新和演进的资产。在 DIKWP 体系中，每一层都比下一层赋予某些特质，从而形成了一个层次化的结构，帮助组织更好地管理和利用复杂信息。

什么是 DIKWP 图谱（数据图谱、信息图谱、知识图谱、智慧图谱、意图图谱）？

DIKWP 图谱是一种由数据图谱、信息图谱、知识图谱、智慧图谱和意图图谱组成的系统化概念，它是一种用于组织、管理和表示复杂信息的方法。DIKWP 图谱将信息和知识视为基础，并将其视为可以不断更新和演进的资产。在 DIKWP 图谱中，每一层都比下一层

赋予某些特质，从而形成了一个层次化的结构。

在 DIKWP 图谱中，数据图谱是最基本的层次，它负责收集、存储、处理和传输信息。数据图谱之上是信息图谱，它负责对数据进行分类、编码和解码，以便于存储和传输。信息图谱之上是知识图谱，它负责对信息进行分析和解释，以便于理解和应用。知识图谱之上是智慧图谱，它负责对知识进行推理和决策，以便于做出明智的决策。智慧图谱之上是意图图谱，它负责对智慧进行表达和传递，以便于实现特定的意图和目的。意图图谱之上是 DIKWP，它是 DIKWP 图谱的最高层次，它是一个复杂的系统化概念，可以帮助组织更好地管理和利用复杂信息。

总之，DIKWP 图谱是一种用于组织、管理和表示复杂信息的方法，它将信息和知识视为基础，并将其视为可以不断更新和演进的资产。在 DIKWP 图谱中，每一层都比下一层赋予某些特质，从而形成了一个层次化的结构，帮助组织更好地管理和利用复杂信息。

怎么理解 DIKWP 图谱？

DIKWP 图谱是一种由数据图谱、信息图谱、知识图谱、智慧图谱和意图图谱组成的系统化概念，它是一种用于组织、管理和表示复杂信息的方法。DIKWP 图谱将信息和知识视为基础，并将其视为可以不断更新和演进的资产。在 DIKWP 图谱中，每一层都比下一层赋予某些特质，从而形成了一个层次化的结构。

在 DIKWP 图谱中，数据图谱是最基本的层次，它负责收集、存储、处理和传输信息。数据图谱之上是信息图谱，它负责对数据进行分类、编码和解码，以便于存储和传输。信息图谱之上是知识图谱，它负责对信息进行分析和解释，以便于理解和应用。知识图谱之上是智慧图谱，它负责对知识进行推理和决策，以便于做出明智的决策。智慧图谱之上是意图图谱，它负责对智慧进行表达和传递，以便于实现特定的意图和目的。意图图谱之上是 DIKWP，它是 DIKWP 图谱的最高层次，它是一个复杂的系统化概念，可以帮助组织更好地管理和利用复杂信息。

总之，DIKWP 图谱是一种用于组织、管理和表示复杂信息的方法，它将信息和知识视为基础，并将其视为可以不断更新和演进的资产。在 DIKWP 图谱中，每一层都比下一层赋予某些特质，从而形成了一个层次化的结构，帮助组织更好地管理和利用复杂信息。

3. 文心一言的 DIKWP 应用示例

3.1 健康问题的 DIKWP 分析

1. 17 岁青少年如果体重超过 180 斤就会有患上心脏病的风险将其称为肥胖病

2. Tom 是 17 岁，体重为 185 斤。
3. Tom 时常为自己的体重而烦恼，最近饭量有所下降
4. Tom 在电视上看到了肥胖病的新闻。
5. 前两天，Tom 收到了一张减肥培训班的传单，上面明确表示报班需要自身没有肥胖病。
6. Tom 想要去医院。

请分析出上面描述中所包含的数据、信息、知识、智慧和意图，并以表格的方式输出。然后，分别构建出数据、信息、知识、智慧和意图的图谱，并给出详细过程。绘制上面数据层、信息层、知识层、智慧层与意图层之间的关系。

数据层	信息层	知识层	智慧层	意图层
数据	17 岁青少年体重超过 180 斤	有患上心脏病的风险	肥胖病	患上心脏病
Tom	体重为 185 斤	时常为自己的体重而烦恼	饭量有所下降	为自己的体重而烦恼
Tom	看到了肥胖病的新闻	前两天收到了减肥培训班的传单	没有肥胖病	报班需要自身没有肥胖病
Tom	想要去医院	想要减肥	有意图去减肥	去医院

3.2 健康问题的推理与建议

Tom 很可能或者已经得了什么病，依据是什么？

Tom 应该采取什么样的行动保护自己的健康？

绘制出以上行动的示意图。

Tom 可能得了什么病或者已经患病，原因可能包括：

1. 超重或肥胖：Tom 的体重超过了健康的范围，可能已经患上了肥胖病。
2. 饮食不均衡：Tom 可能饮食不均衡，缺乏足够的营养素，从而导致健康问题。
3. 缺乏锻炼：Tom 可能缺乏锻炼，导致身体素质下降，增加患病的风险。

Tom 可以采取以下行动保护自己的健康：

4. 减轻体重：Tom 可以通过控制饮食、增加锻炼等方式减轻体重，保持健康的体重。
5. 改善饮食习惯：Tom 可以调整自己的饮食习惯，多吃蔬菜水果、蛋白质丰富的食物，避免高热量、高脂肪的食物。
6. 增加运动量：Tom 可以加强锻炼，增加身体的代谢水平，提高身体的免疫力。

3.3 心理学的 DIKWP 分析

1. Alex 时常为自己的言行感到内疚自责，情绪波动大，经常感觉低落。
2. Elisabeth 经常为自己的言行感到内疚羞愧，情绪整体感觉绝望。
3. Lee 偶尔为自己的言行感到不好意思，并且情绪偶尔感觉孤独。
4. Caroline 越来越不爱说话，最近连课外活动都不敢正视伙伴了。并且有人喊他参加以前喜欢的足球活动都不参加了，穿的衣服色彩也开始变的越来越暗淡，经常脏兮兮的。

如果 Elisabeth 被诊断为中度抑郁，抑郁倾向 70%，Caroline 被诊断为抑郁倾向从 5%发展到 30%。请根据上述内容，总结出数据、信息、知识、智慧、意图，并分别构建出图谱，并给出详细过程。

请根据上面的描述结合 Elisabeth、Caroline 的情况及诊断结果，对 Alex 进行抑郁概率进行评估并给出形式化表达过程？如果 Alex 被参考了其它医学指标进行知识诊断为重度抑郁，那么他的那些数据和信息指标可能有采集错误？

Alex 的抑郁概率计算过程：

根据 Elisabeth 的情况，她可能患有中度抑郁和抑郁倾向 70%。根据 Caroline 的情况，她可能患有抑郁倾向从 5%发展到 30%。根据两人的情况，假设 Alex 的抑郁概率为 x ，则有：

- $x \leq 0.7$ ，表示 Alex 没有抑郁症状。
- $0.7 \leq x \leq 0.8$ ，表示 Alex 有轻度抑郁症状。
- $x \geq 0.8$ ，表示 Alex 患有中度抑郁症状。因此，Alex 被参考了其它医学指标进行知识诊断为重度抑郁的情况下，他的抑郁概率可能为 $0.7 \leq x \leq 0.8$ 。

如果 Alex 被参考了其它医学指标进行知识诊断为重度抑郁，那么他的数据和信息指标可能有采集错误，因此需要重新采集数据和信息指标来计算他的抑郁概率。

3.4 心理学的量化分析

Alex 的数据 11:70% 信息 1: 不好意思 信息 2: 情绪低落 信息 3: 孤独 诊断结果: 中度抑郁
Max 的数据 1:5%-30% 信息 1: 不爱说话 信息 2: 不参加活动 信息 3: ? 诊断结果:
抑郁倾向 根据上面的数据生成表格。根据上面的表格, 推理出 Alex 的信息 3 的具体描述, 给出详细的过程

Alex 的信息 3 可能描述为“不爱说话”或“不参加活动”。

根据表格中的信息, Alex 的数据 11:70% 包含了“不好意思”和“情绪低落”, 这意味着他可能感到不好意思或情绪低落。由于他的数据 5%到 30%包含了“不爱说话”和“不参加活动”, 因此这两个信息也可能是他信息 3 的具体描述。

在这种情况下, 我们可以使用逻辑推理来推断 Alex 信息 3 的具体描述。由于他的数据 11:70% 包含了“不好意思”, 因此他可能感到不好意思。由于他的数据 5%到 30%包含了“不爱说话”, 因此他可能不爱说话或不参加活动。由于他的数据 5%到 30%包含了“不参加活动”, 因此他可能不参加活动。

因此, Alex 的信息 3 可能是“不爱说话”或“不参加活动”。

3.5 人事管理的 DIKWP 分析

Alex 和 John 都是计算机行业相关的求职人员, Alex 是应届毕业生, John 是有 3 年工作经验的从业者。某公司发出如下招聘信息:

1. 招收计算机软工工程师, 1-3 年相关从业经验, 优秀应届毕业生也可以投递简历。
2. 需要吃苦耐劳, 有追求技术的热情和良好的责任心, 同时具有比较好的学习能力和变化适应的能力。
3. 偶尔能够适应加班。
4. 了解 Java、C++或者其他编程语言, 有良好的编程功底和文档阅读以及撰写能力。
5. 有一定的英文阅读能力。

Alex 的简历除了基本信息外, 强调了自己有过半年实习经历, 性格上也开朗随和能和别人相处融洽, 在学校拿过奖学金, 成绩较为优秀, 英语阅读能力优秀, 能够适应经常加班的要求, 但是没有相关编程的功底。John 的简历除了基本信息外, 有 3 年工作经验, 熟悉 Java 语言, 参与过多个开发项目。但是他在简历上强调了自己性格沉稳, 虽然不善于交际, 但是富有责任心。

请问如果我是 HR, 应该选择哪个作为公司员工? 能不能从数据层、信息层、知识层、智慧层、意图层上进行详细地对比?

数据层：John 的数据比 Alex 多，John 有 3 年工作经验，有相关的实习经历，而 Alex 只是应届毕业生。

信息层：Alex 的简历上强调了自己有过半年实习经历，性格上开朗随和能和别人相处融洽，在学校拿过奖学金，成绩较为优秀，英语阅读能力优秀，能够适应经常加班的要求，但是没有相关编程的功底。而 John 的简历上则强调了自己性格沉稳，富有责任心，不善于交际，但是富有责任心。

知识层：Alex 的简历上只是提到了 Java 和 C++ 等编程语言，而 John 的简历上则提到了 Java 语言的熟练掌握，以及多个开发项目的参与经历，因此 John 的知识层更加丰富。

智慧层：Alex 和 John 在面试中的表现都比较优秀，都能够回答出关于编程语言的相关问题，但是 John 在简历上也提到了自己的责任心，因此 John 可能会更加适合公司的工作。

意图层：无法从数据层、信息层、知识层、智慧层、意图层上推测出 HR 会选择哪个作为公司员工，因为这些数据和信息只是表明候选人的优势和特点，而真正的决策者可能会考虑更多的因素，例如候选人的职业素养、工作态度、工作能力、个人价值观等。

如果该公司是个创业公司，业务发展迅速。该公司的最后一个面试官面试了这两个人，对于他们面试表现都很满意。但是面试官他考虑到未来发展，希望性格成熟稳重，发展潜力巨大的人来到公司，同时希望培养员工接手新项目，我最后应该如何决策？

这是一个需要谨慎考虑的决策，因为它会影响整个团队的未来发展。以下是一些建议，可以帮助您做出最佳决策：

1. 评估候选人的技能和经验：您需要评估候选人的技能和经验，以确保他们能够胜任新项目的工作。您可以询问候选人以前从事过的项目，以及他们如何解决问题和适应变化的。这可以帮助您了解候选人的技能水平和经验。
2. 考虑候选人的性格特点：如果您希望团队成员拥有成熟稳重的性格特点，那么您可以考虑候选人是否具有这些特点。您可以了解候选人的性格，并确保他们愿意接受新的挑战和责任。
3. 了解候选人的个人发展计划：您需要了解候选人的个人发展计划，以确定他们是否有足够的发展潜力来接手新项目。如果候选人计划在未来几年内继续学习和发展，那么您可能会考虑他们。
4. 确定候选人的薪资要求：如果候选人的薪资要求与公司的薪资结构不匹配，那么您可能需要重新考虑您的决策。您可以询问候选人的薪资要求，以确保他们的薪资要求符合公司的薪资结构。

5. 仔细考虑其他因素：除了技能和经验、性格特点、个人发展计划和薪资要求，您还需要考虑其他因素，例如候选人的工作态度、团队合作能力、领导能力等。您需要综合考虑这些因素，并做出最佳决策。

最后，您应该根据您的决策权衡候选人的技能和经验、性格特点、个人发展计划和薪资要求，并做出最佳决策。

给出上面数据层、信息层、知识层、智慧层、意图层的意向图

在上面的问题中，可以使用结构化思维来构建意向图。具体来说，可以按照以下步骤进行：

1. 确定数据层：在上面的例子中，可以将 Alex 和 John 的基本信息（如年龄、性别、学历、工作经验等）作为数据层。
2. 确定信息层：在上面的例子中，可以将 Alex 和 John 的简历和面试表现作为信息层，以便更好地了解他们的背景和技能。
3. 确定知识层：在上面的例子中，可以将 John 的工作经验和技能作为知识层，以便了解他在计算机行业的从业经验和技能。
4. 确定智慧层：在上面的例子中，可以将 John 的性格特点和个人发展计划作为智慧层，以便了解他是否适合公司的文化和工作氛围。
5. 确定意图层：在上面的例子中，可以将 HR 的决策需求作为意图层，以便了解 HR 的决策目标和优先级。通过结合数据层、信息层、知识层、智慧层和意图层，可以更加全面地了解 Alex 和 John 的情况，并帮助 HR 做出更加合理的决策。

4. 应用讨论

本文借助所提 DIKWP 评测体系针对百度的“文心一言”进行展示，首先对“文心一言”的数据处理能力、信息处理能力、知识处理能力、智慧处理能力和意图处理能力进行了单项测试，然后对“文心一言”的数据、信息、知识、智慧和意图之间的转换能力进行初步测试，还在不完整、不精确和不一致的数据信息、知识智慧意图情形下进行了 DIKWP 校验测试。后续我们还将继续从不完整、不精确、不一致的 DIKWP 输入到不完整、不精确、不一致的 DIKWP 输出的问题情形进行进一步的测试和对比分析。

参考文献

- [1] Bubeck, Sébastien, Varun Chandrasekaran, Ronen Eldan, Johannes Gehrke, Eric Horvitz, Ece Kamar, Peter Lee et al. "Sparks of artificial general intelligence: Early experiments with gpt-4." arXiv preprint arXiv:2303.12712 (2023).
- [2] Li, Yingbo, Yucong Duan, Zakaria Maamar, Haoyang Che, Anamaria-Beatrice Spulber, and Stelios Fuentes. "Swarm differential privacy for purpose-driven data-information-knowledge-wisdom architecture." *Mobile Information Systems 2021* (2021): 1-15.
- [3] Mei, Yingtian, Yucong Duan, Liang Chen, Zaiwen Feng, Lei Yu, and Zhendong Guo. "Purpose Driven Disputation Modeling, Analysis and Resolution Based on DIKWP Graphs." In *2022 IEEE 24th Int Conf on High Performance Computing & Communications; 8th Int Conf on Data Science & Systems; 20th Int Conf on Smart City; 8th Int Conf on Dependability in Sensor, Cloud & Big Data Systems & Application (HPCC/DSS/SmartCity/DependSys)*, pp. 2118-2125. IEEE, 2022.
- [4] Yongbo Li, Yucong Duan, *The Wisdom of Artificial General Intelligence: Experiments with GPT-4 for DIKWP*, in publishing.