

Exploration of the Generation of Water Metaphors in Chinese

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Abstract—According to the conceptual metaphor, this paper studies the characteristics and paths of water metaphor generation from the two aspects of the source domain and the target domain of word clustering. The results show that water, as a natural substance category, is the most common concept category in the source domain. Based on the attribute features of water, we combine the Word2Vec algorithm and word similarity computation to explore the path of generating water metaphor sentences, and finally realize the formation of "n+v" or "v+n" semantic conflict by examining the word similarity as a condition, so as to generate water metaphor sentences. At the same time, the language generation ability of the language model ChatGPT is tested, providing a reference for subsequent machine metaphor generation.

Keywords—word clustering; water metaphor generation; similarity calculation

I. INTRODUCTION

Metaphor is a hot topic in current research and a difficult problem to be overcome in natural language processing. Lakoff(1980) believes that language is full of metaphors and metaphors are universal. Metaphor is the way of human thinking and the way of cognizing and constructing the world. The essence of metaphorical thinking is the process of mapping across conceptual domains in a conceptual system (Wu Fang, 2019). Conceptual metaphors are considered in cognitive linguistics to consist of two parts, a source domain and a target domain, and the cognitive power of metaphors lies in mapping the schematic structure of the source domain onto the target domain (Lan Chun, 2005). According to Wang Zhimin (2010), the source domain is generally filled by nouns that identify concrete things, and the target domain is generally words with abstract meanings, and the metaphorical process usually involves using simple things that one is familiar with to analogize and interpret complex and unfamiliar things.

"Water is the source of life", this familiar saying still exists in the metaphor, about the "water" metaphor in daily life and academic classics in a wide range of applications:

(1) 就是像水一样平淡, 曲径到达终点的事物。

Jiù shì xiàng shuǐ yī yàng píndàn, qūjìng dàodá zhōngdiǎn de shìwù.

It is something as plain as water, which reaches its end by a winding path.

(2) 他一生就像水一样清白。

Tā yīshēng jiù xiàng shuǐ yīyàng qīngbái.

His life is as pure as water.

(3) 回首沧桑, 只愿平淡如水。

Huíshǒu cāngsāng, zhǐ yuàn píndàn rú shuǐ.

Looking back on the vicissitudes of life, I wish to be as plain as water.

Water plays an important role in human cognition and life, without water there is no life, from ancient to modern times there are many metaphors about water embodied in the language, from the ancient texts, such as "Virtue of the Taoist scriptures", "Laozi" and "Poetry" and other classic works can be seen in the use of water metaphors are very common, so this paper to water metaphors to explore.

Academics have paid much attention to the water metaphor, and one of the earliest articles on the water metaphor searched from HowNet in China analyzes Shen Congwen's perception of water in his works by considering water as a metaphor for life (Jiang Jinyuan, 2000). Later scholars mostly took a philosophical perspective, and Diao Shenghu (2006) explicitly pointed out that water functioned as a root metaphor in ancient China. The practice of using water as a metaphor for virtue, water as a metaphor for morality, water as a metaphor for politics, and water as a metaphor for social personnel, such as using water as a metaphor for natural water, was a basic habit of thought and rhetorical tendency of the ancient Chinese. Wang Yingxue (2008) analyzes the universality of metaphors based on the contemporary metaphor theory of Leko and others, and takes the perception of "water" as an example. Based on the fluidity of water, four common conceptual metaphors are summarized and discussed, enriching the comparative analysis of language and thinking at the micro level. From the cognitive point of view, Nie Yaning (2006) analyzed some conceptual metaphors involving water in Chinese, i.e., movement is water, power is water, thought is water, and problem is water, and analyzed the intrinsic connection between the source domain "water" and its four target domains. Lv Xiaoli (2009) analyzed the water metaphor from the perspective of cognitive linguistics. Taking the word "water" as an example, the nature and function of water itself make the word produce a series of variations and enrichment in meaning and usage, and the paper tries to explain these phenomena from the perspective of metaphorical cognition, but the analysis is not specific enough and vague; the foreigners who have paid more attention to the metaphor of water are the American scholars, such as Alliance Castro's The Way of Water and the Buds of Virtue (1997), in which she combines the root metaphors of ancient Chinese philosophy in a profound exploration with a view to discovering the real connotation of water metaphors.

Through the examination of related literature, it can be found that water metaphor-related studies include cognitive studies and comparative analysis, but less computational thinking is involved. Therefore, this paper starts from

This work was supported by Major Program of National Social Science Foundation of China (18ZDA295); Scientific research projects of the State Language Commission (ZDI135-139); the Fundamental Research Funds for the Central Universities (19PT03); and the Research Funds of Beijing Language and Culture University(22YCX174)

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conceptual metaphors to study the intrinsic connection between the mapping of the source and target domains of water metaphors to find the intrinsic linkage mechanism. By summarizing the classification of source and target domains, what kind of mapping relationship can be observed between the mappings? What are the characteristics and differences of the words that can enter the source and target domain positions? The cognitive domain categories of target domain can be found through qualitative and quantitative examination. Finally, this paper focuses on the categorization characteristics of the source and target domains of water metaphors in the light of the current research on metaphor cognition, and derives the clustering of water metaphor words, which provides a reference for machine understanding of metaphors.

II. CONCEPTUAL METAPHOR SEMANTIC CLASS ANALYSIS

A. Conceptual Metaphors Source Domain and Target Domain Clustering

This paper collects 33,132 pieces of corpus from BCC corpus with the search format of "n is n", "n+n is n", "n is n+n", "n+n is n+n". After de-emphasizing and eliminating invalid homonyms, a total of 1,210 valid corpora are obtained, all of which are instances of Chinese metaphorical expressions, which are manually abstracted and refined to obtain the conceptual metaphorical root metaphors and 1,210 conceptual metaphorical concepts of Chinese concepts are obtained. The following is an analysis of concepts for conceptual metaphor.

In this paper, the semantic concept classification of Chinese Concept Dictionary (CCD) developed by the Institute of Computational Linguistics, Peking University is chosen as a reference, but it is not constrained to this classification system, and it is adjusted in the local classification according to the characteristics of the metaphors. There are a total of 25 initial concept nodes in CCD. The distribution of concept nodes in CCD is as follows in Table 1:

TABLE I. DISTRIBUTION OF CCD CONCEPT NODES

Distribution of CCD Concept Nodes				
Human	Animal	Plant	Artifact	Nature
Body	Matter	Food	Attribute	Value
Relationship	Communication	Time	Cognitive Knowledge	Sensation Emotion
Motivation	Natural Phenomenon	Process	Action Behavior	Event
Group Community	Location Place	Object	Shape	State

According to Lakoff, the format of conceptual metaphor is "X is Y", which gives rise to a variety of metaphorical expressions, and analyzing the source and target domains is the key to studying metaphors. The corpus analysis reveals that there are 97 conceptual domains in the target domain "X" of the conceptual metaphor, and according to the conceptual nodes of CCD, the semantic classes are divided into 16 categories. Quantitative comparison of Feeling emotion, Group group, Attribute property, Relation, Event, Cognitive knowledge, Process, Artificial object, Quantitative value, Human beings, Body, Time, Location, Natural objects,

Communication and Food. The conceptual classification of the target domain "X" is shown in Figure 1.

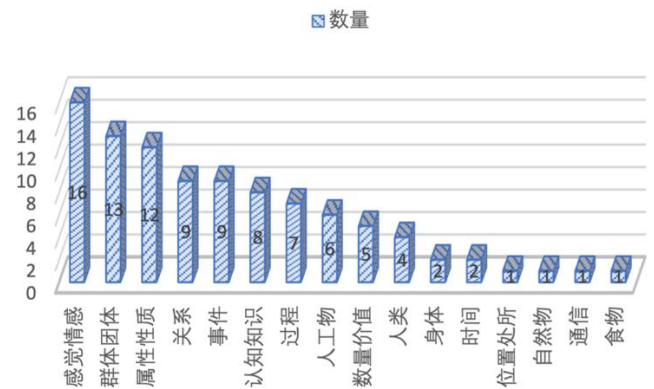


Fig.1. Conceptual classification of target domain "X"

The corpus analysis reveals that there are 207 conceptual domains in the source domain "Y" in the conceptual metaphor, and according to the conceptual nodes of CCD, the semantic classes are divided into 20 categories. The concepts of source domain "Y" are categorized as follows in Figure 2.

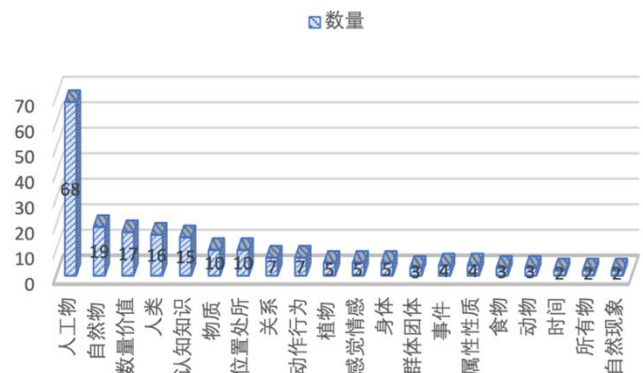


Fig.2. Conceptual classification of source domain "Y"

According to Figure 2, it can be seen that "artifacts" is the most numerous, which is in line with the human cognition that the source domain is a simple, concrete and easy-to-understand concept, and that artifacts are the closest things that can be used by human beings, so they are often used as the source domain, and "natural objects" accounts for the second place, of which the words related to "water" are mostly found when the source domain is a natural phenomenon. When the source domain is a natural phenomenon, the words related to "water" are mostly found in the real corpus:

(4) 那片湖泊的水面宛如明镜，清澈透亮。

Nà piàn húpō de shuǐmiàn wǎn rú míngjìng, qīngchè tòuliàng.

The lake's surface is like a clear mirror, sparkling and transparent.

(5) 浪水拍打着海岸，发出翻滚的声响。

Làng shuǐ pāidǎ zhe hǎi'àn, fāchū fāngǔn de shēngxiǎng.

Waves crash against the shore, creating a rolling sound.

(6) 雨后的山谷像水一样静谧，弥漫着一种宁静的气息。

Yǔhòu de shāngǔ xiàng shuǐ yīyàng jìngmì, mí màn zhe yīzhǒng níngjìng de qìxī.

The rain-soaked valley is calm like water, filled with a peaceful atmosphere.

In the above three sentences, (4) compares the water surface of the lake to a mirror through simile, which expresses the characteristic of clear and bright water in a vivid way. At the same time, the use of the adjective "clear and bright" emphasizes this characteristic, making the sentences more vivid and vivid. (5) describes the sound of the waves lapping against the shore, expressing the scene of rolling waves. At the same time, the verbs "lapping" and "tumbling" are used to compare the waves with human beings, which makes the sentences more vivid and vivid. (6) emphasizes quietness of the water by describing the tranquil atmosphere of the valley after the rain, which conveys a sense of peace and quiet.

B. Characteristics and Generative Methods of Examining Water Metaphors

The metaphor of water in Chinese is based on the understanding of conceptual metaphors. Upon analysis, it can be observed that there are numerous target domains for water metaphor in Chinese, such as movement, time, money, people from Hunan province, emotions, power, environment, and so on. Wang Zhimin (2009) points out that metaphors often involve the simultaneous presence of source and target domains, and the deeper meanings expressed by metaphors are often only deposited in the source domain. This also explains why all noun metaphors in Chinese have a semantic emphasis. At the same time, the mapping process of water metaphor in Chinese reveals two key points. One is the similarity in physical features, such as shape and color, which are visibly apparent. The other key point is the similar impact on the real world and people, focusing more on the psychological aspect.

(7) 真心话像泉水一般清澈见底。

Zhēnxīnhuà xiàng quán shuǐ yībān qīngchè jiàndǐ.

Truthfulness is as clear as spring water.

(8) 母爱如水，滋润孩子心灵。

Mǔ ài rú shuǐ, zīrùn hái zǐ xīnlíng.

A mother's love is like water that nourishes a child's mind.

In these two sentences, (7) uses the physical characteristic of water, i.e., its clarity and transparency, as a metaphor for the truthfulness, transparency and ease of seeing truthfulness. This metaphor is relatively obvious and direct, so that one can understand its meaning at once. At the same time, the phrase "see the bottom" also implies the depth

and truthfulness of the truthfulness. (8) focuses more on the psychological impact of water, i.e., its ability to nourish and satisfy people's cravings, it is a metaphor for a mother's love to nourish and satisfy a child's needs. This metaphor is more abstract, but it is also vivid and graphic so that people can feel the warmth and nourishment of a mother's love. At the same time, the word "heart" in the sentence also implies the depth and influence of a mother's love.

Before examining the generation of water metaphors, it is necessary to analyze the characteristics and generation methods of water metaphors in Chinese. The following are relevant viewpoints:

Water is one of the commonly used metaphorical objects in Chinese, often used to metaphorically describe similar physical features and human emotions, thoughts, and behaviors. Water metaphors have three characteristics, as follows:

1. Diversity: Water metaphors come in various forms and can describe aspects of human emotions, thoughts, and behaviors.

2. Vividness: Water metaphors are expressed vividly and imaginatively, reflecting human emotions and thoughts profoundly.

3. Common usage: Water metaphors are commonly used in Chinese as a metaphorical technique, widely applied in literature, poetry, literary classics, news reporting, and other fields.

Generating water metaphors requires the integration of techniques and methods from various fields such as linguistic reasoning models and computers. The specific methods are as follows:

1. Collect relevant language data: Gather language data related to water, such as poetry, literary works, news reports, etc., to train models and gain inspiration.

2. Determine metaphor themes and types: Determine the desired theme as "water" and the metaphor category, such as clarity, flow, coolness, etc.

3. Identify semantic conflicts: Ensure the presence of "v+n" and "n+v" semantic conflicts related to "water" in the sentence, analyze the metaphor basis, metaphor relationship, and constituent elements of the two domains of metaphor. For example, "water flow" can be metaphorically related to the passage of time or the process of life.

4. Creatively generate sentences: Use natural language processing techniques to generate metaphorical sentences about water.

5. Evaluate the quality of generated sentences: Evaluate the quality and readability of the generated sentences through manual or automatic evaluation methods, in order to make adjustments and improvements.

Understanding the classification of conceptual metaphors, the classification of target and source domains in conceptual metaphors, and the importance of water as a natural entity in the source domain, can facilitate the exploration of the generativity of water metaphors. By combining the characteristics and generation methods of water metaphors, a specific exploration of the generativity of water metaphors can be conducted.

III. EXPLORATION OF WATER METAPHOR GENERATION

A. Analysis of water metaphor recognition

To analyze the generation of water metaphors, it is necessary to first identify water metaphors, as metaphor identification is the foundation of metaphor generation. First of all, the following analysis of metaphor identification, water is a large and wide, covering a large number of meanings, so first of all, according to the "Thesaurus Expanded" to find synonyms related to water, and "water" semantically related synonyms, to get eight subclasses, the artificial provisions of the number of words in each class is less than or equal to ten:

1. Water source: spring, spring water, water vein, water source head, water well, water eye, spring eye, borehole, canal water, stream water.

2. Water flow: rivers, streams, creeks, canals, streams, tides, waves, tides, water potential, water flow.

3. Water quality: water color, clear, clarified, turbid, dirty, pure, fresh water, salt water.

4. Hydrology: water conservancy, water transportation, hydrology, hydrography, hydrography, hydrological stations, hydrological monitoring.

5. Aquatic: fishery, aquatic products, aquatic life, aquaculture, aquatic resources, aquatic processing.

6. Water conservancy: irrigation, drainage, water diversion, water storage, dams, water conservancy projects, water conservancy facilities.

7. Hydrotherapy: hot springs, baths, hydrotherapy, spa centers.

8. Water and gas: water vapor, water vapor, water mist, water dew, water climate.

Among the above eight categories, water source and water flow are the categories that account for more examples of common metaphorical expressions, which indicates that water is the most primitive and the closest substance to human life, and people can't live without water, and we often say that water is the source of life, and water is ubiquitous, and this direct experience will be mapped to all aspects of the actual metaphorical expressions. Other categories form relatively few metaphorical expressions, but also reflects the breadth of people's thinking, people's metaphorical mapping of the concept of water is very far-reaching, to meet the needs of different expressions.

Secondly, according to the words related to water in the category of water source, using {spring, spring water, water vein, water source head, well, water eye, spring eye, borehole, canal, stream} as the search keywords as the source domain combined with introspection to find the relevant metaphorical instances in the real corpus, we get the following metaphorical expression instances with the category of water source as the source domain:

(9) 心中有一股清泉, 永远不会干涸。

Xīn zhōng yǒu yī gǔ qīngquán, yǒngyuǎn bù huì gānhé.

There is a clear spring in the heart that will never dry up.

(10) 在这个竞争激烈的市场上, 公司需要洞察市场的井眼, 才能获得竞争优势。

Zài zhè ge jìngzhēng jīliè de shìchǎng shàng, gōngsī xūyào dòngchá shìchǎng de jǐngyǎn, cái néng huòdé jìngzhēng yōushì.

In this highly competitive market, companies need insight into the wellbore of the market to gain a competitive advantage.

(11) 在商业领域中, 信息流通的渠水越畅通, 企业发展越快速。

Zài shāngyè lǐngyù zhōng, xīnxī liútōng de qú shuǐ yuè chàngtōng, qǐyè fāzhǎn yuè kuàisù.

In the commercial field, the smoother the channel of information flow, the faster the development of enterprises.

In the above sentences, (9) compares the "mind" to "spring water", metaphorically expressing the purity and clarity of one's heart. (10) compares the "market" to a "wellbore", emphasizing the need for companies to gain deep insight into the core of the market to gain a competitive advantage. (11) compares "information flow" to "water flow", highlighting the importance of a smooth flow of information for the rapid development of enterprises.

According to the words related to water in the category of water flow, using {lake, river, creek, canal, stream, tide, wave, tidal wave, water potential, water flow} as the search keywords as the source domain combined with introspection to find the relevant metaphorical instances in the real corpus, and obtaining the following expressions of metaphorical instances with the category of water source as the source domain:

(12) 时间如同一条奔腾不息的大河, 永远不会停歇。

Shíjiān rútóng yī tiáo bēnténg bùxī de dàhé, yǒngyuǎn bù huì tíngxiē.

Time is like a great rushing river that never stops.

(13) 这家公司的市场竞争水势非常猛, 需要采取更加激进的营销策略。

Zhè jiā gōngsī de shìchǎng jìngzhēng shuǐshì fēicháng měng, xūyào cǎiqǔ gèngjīn de yíngxiāo cèlüè.

This company is in a very competitive market and needs to adopt a more aggressive marketing strategy.

(14) 这个平台是一个非常好的交流渠道, 可以让不同领域的人们分享彼此的知识 and 经验。

Zhè ge píngtái shì yī ge fēicháng hǎo de jiāoliú qúdào, kěyǐ ràng bùtóng lǐngyù de rénmen fēnxiǎng bǐcǐ de zhīshì hé jīngyàn.

This platform is a very good communication channel for people in different fields to share their knowledge and experience with each other.

In the above sentences, (12) compares the continuous flow of a river to the continuous and unstoppable nature of time, implying that time is like a rushing river that never stops. (13) metaphorically describes the intensity and momentum of market competition as "water momentum," indicating that this company faces fierce market competition

and needs to adopt more aggressive marketing strategies to succeed. (14) uses "channel" as a metaphor for the means and platform of information exchange, highlighting that the platform is an excellent channel for people from different fields to share their knowledge and experiences with each other.

The above metaphorical sentences based on the proximity of water are referred to as "S-sentences", twenty of which were identified based on a search in the corpus, and the list of "S-sentences" with the noun C1 can be shown in Table 2 below:

TABLE II. C1 NOUN LIST IN "S SENTENCE"

S sentence	Noun List
C1	Spring, her words, company's operation, market, memory, eyes, this meadow, company, information, life, company, time, small business, platform, life, fashion trend, emotion, business cycle, market competition, data

According to Jia Yuxiang (2009), the "A is B" type of metaphor is understood by knowing the target domain A and the source domain B, and solving for the metaphorical base X, i.e., "A is B" = "A is like B like X", which is formally denoted as $X = C(A, B)$ (C stands for Comprehension). The intersection of features of A and B refers to the features shared by two or more things, and X is the common attribute feature of A and B.

In this paper, we argue that it would be possible to find out more examples of water metaphors if they could be realized by Sentence Extension implementation, i.e., given the target domain A and the feature X to be described, formalized as $Y = F(X, A)$ (F stands for Find). Find the source domain B that can highlight the feature, find the water metaphor example "T-sentence", and when the source domain Y with the feature has the same or similar attribute characteristics of the water conceptual metaphor, then we can complete the metaphor recognition and then complete the automatic generation of the machine, which needs to find out the attribute characteristics related to the conceptual metaphor of water in the previous section. The attribute features of the conceptual metaphor of water are shown in Table 3 below:

TABLE III. ATTRIBUTE CHARACTERISTICS OF THE CONCEPTUAL METAPHOR OF WATER

A	Attribute Characteristics
Water	Transparent, clear, pure, clean, important, precious, gentle, graceful, mysterious, soft, flexible, abundant, flowing, natural, free, versatile, deep, fluid, healing, irreversible, indispensable, unpredictable, uncontrollable, elusive, dangerous, negative, catastrophic

To find metaphorical sentences about water, denoted as "T sentence," in a corpus, the following three conditions need to be satisfied:

1. The "T sentence" contains conceptual metaphorical attributes related to water.
2. The semantic similarity between the noun lists C2 in the "T sentence" and C1 in the "S sentence" is high.
3. The "T sentence" itself exhibits semantic conflicts in the form of n+v, v+n, or n+n.

To achieve metaphor identification and generation, we can use computational thinking to address conditions 2 and 3.

Condition 2 can be transformed into calculating the cosine similarity between the noun lists C1 and C2. When the calculated similarity between C1 and C2 is close to 1, condition 2 is satisfied. First, we need to convert the words in both lists into word vectors. We can use the Word2Vec algorithm from the gensim library in Python, which provides pre-trained word vector models. Each word is mapped to a high-dimensional vector in a vector space, representing semantic and syntactic relationships. Cosine similarity is a method to measure the cosine value of the angle between two vectors, ranging from -1 to 1. A value of 1 indicates complete similarity, -1 indicates complete dissimilarity, and 0 indicates no relationship. The cosine similarity can be calculated using the following formula:

$$\text{Cosine_similarity}(A, B) = (A \cdot B) / (\|A\| * \|B\|)$$

By running the Python code, if the cosine similarity between C1 and C2 is close to 1, it means that the words in these two lists are semantically similar, satisfying condition 2.

Condition 3 states that the "T sentence" should exhibit semantic conflicts in the form of n+v, v+n, or n+n. This can be determined by calculating the mutual information between the words in the "T sentence." We can consider metaphorical sentences as phrases composed of two words and calculate the mutual information value between them to determine if they have metaphorical meaning. If the mutual information value between the words is significantly higher than their baseline frequency in the corpus, then the sentence can be considered to have metaphorical meaning.

Which needs to be satisfied: mutual information value between words > base frequency of words

The baseline frequency of a word w in the corpus can be calculated using the following formula: $P(w) = nw / N$ where nw is the number of occurrences of word w in the corpus, and N is the total number of occurrences of all words in the corpus.

The mutual information between two words w1 and w2 can be calculated using the following formula: $I(w1, w2) = \log_2(P(w1, w2) / (P(w1) * P(w2)))$ where $P(w1, w2)$ is the co-occurrence probability of w1 and w2 in the corpus, and $P(w1)$ and $P(w2)$ are the baseline frequencies of words w1 and w2 in the corpus.

By combining the high semantic similarity between the noun lists C1 in the "S sentence" and C2 in the "T sentence" obtained from the People's Daily Corpus, we can calculate the mutual information between the words in C2. If the mutual information value exceeds the baseline frequency of the words, it indicates that the sentence has metaphorical meaning. C2 can be shown in Table 4 below:

TABLE IV. C2 NOUN LIST IN "T SENTENCE"

T sentence	Subject Vocabulary List
C2	Love, hope, thoughts, music, life, company, light rain, brook, emotions, gaze, small path, river, river surface, internet, market, time, knowledge, innovation, policy, society, governance, life, talent, communication, trust, education, confidence, civilization, project progress, quiet night, cultural atmosphere, customer resources, economic development

According to the above three conditions of Tables 3 and 4, water metaphor "T sentences" can be generated, such as:

(15) 这些思想在年轻人中流动, 影响了他们的生活。

Zhè xiè sīxiǎng zài niánqīng rén zhī jiān liúdòng, yǐngxiǎng tāmen de shēnghuó.

These thoughts flow among young people and influence their lives.

(16) 他的音乐注入了青春的活力和无限的激情。

Tā de yīnyuè zhùrùle qīngchūn de huóli hé wúxiàn de jīqíng.

His music injects youthful energy and boundless passion.

(17) 这个公司正在引流市场, 争取更多的客户。

Zhège gōngsī zhèngzài yǐnliú shìchǎng, zhēngqǔ gèng duō de kèhù.

This company is diverting the market and attracting more customers.

In these three examples, the verbs "flow", "inject", and "divert" all express the transmission or diffusion of ideas, music, and market among different places or people, which align with the fluidity of water. In (15), the semantic conflict between "ideas" and "flow" indicates that these ideas spread widely like water and have an impact on the lives of young people. In (16), the conflict between "youthful energy and passion" and "inject" suggests that youthful energy and boundless passion, which are abstract concepts, cannot be physically injected. By treating youthful energy and boundless passion as water, it implies that this music can make people feel young and full of passion. In (17), with "company" as the subject and treating the market as water, it can flow to the company and attract more customers through various means. These three examples all use verbs to express the transmission and diffusion of things in different contexts, making the language more vivid and figurative.

This section combines the BCC Modern Chinese Corpus as a basic resource, collects metaphor examples, summarizes and organizes the conceptual metaphor conceptual layers, and statistically analyzes all the conceptual layers, according to the results of the data, we get the classification between the conceptual metaphor source domain and target domain concepts, and we get the importance of the position of water as a natural object in the source domain, and we use the methods of word similarity and mutual information to generate water metaphors, and through the computational thinking, we get the metaphorical example of water that highlights the source domain, "T-sentence", and the attribute characteristics of the source domain of the "T-sentence" and

the conceptual water metaphors are the same or similar, and then we calculate and generate the metaphors of "T-sentence" that have the same attribute characteristics.

B. ChatGPT Test

At the same time, combining with the current popular ChatGPT for generation and detection, ChatGPT is a chatbot based on the GPT (Generative Pre-trained Transformer) algorithm. It can understand user questions through natural language processing techniques and generate corresponding answers. We issued a command to ChatGPT to generate ten sentences with water metaphors, and its response is as follows:

1. 水是生命之源, 如同爱是心灵的泉源。

Shuǐ shì shēngmìng zhī yuán, rútóng ài shì xīnlíng de quánuyuán.

Water is the source of life, just as love is the source of the soul.

2. 人生如水, 波澜起伏, 有时平静如镜, 有时狂风暴雨。

Rénshēng rú shuǐ, bōlán qǐfú, yǒushí píngjìng rú jìng, yǒushí kuángfēng bàoyǔ.

Life is like water, with ups and downs, sometimes calm like a mirror, sometimes stormy.

3. 水滴石穿, 坚持不懈, 必能成功。

Shuǐdīshíchuān, jiānchí bùxiè, bìnéng chénggōng.

Water dripping wears away the stone, perseverance leads to success.

4. 水是柔软的, 却能克服一切障碍, 它教给我们坚韧不拔的精神。

Shuǐ shì róuruǎn de, què néng kèfú yīqiè zhàng'ài, tā jiào gěi wǒmen jiānrèn bùbá de jīngshén.

Water is soft, yet it can overcome all obstacles, teaching us the spirit of perseverance.

5. 溪水潺潺, 清新如画, 如同思绪流淌, 宁静而美好。

Xīshuǐ chánchán, qīngxīn rú huà, rútóng sīxù liútǎng, níngjìng ér měihǎo.

The babbling brook is as refreshing as a painting, flowing like thoughts, serene and beautiful.

6. 水在流动中不断变化, 如同生活中的变幻无常, 需要我们随时调整心态。

Shuǐ zài liúdòng zhōng bùduàn biànhuà, rútóng shēnghuó zhōng de biànhuàn wúcháng, xūyào wǒmen suíshí tiáozhěng xīntài.

Water constantly changes as it flows, just like the ever-changing nature of life, requiring us to adjust our mindset at any time.

7. 水的力量是无穷的, 如同我们内心深处的力量, 只要发挥出来, 便能创造奇迹。

Shuǐ de lìliàng shì wúqióng de, rútóng wǒmen nèixīn shēnchù de lìliàng, zhǐyào fāhuī chūláí, biàn néng chuàngzào qíjī.

The power of water is infinite, just like the power deep within us. Once unleashed, it can create miracles.

8. 水是一种自然的镜子，反映出我们的内心和外在世界。

Shuǐ shì yī zhǒng zìrán de jìngzi, fǎnyìng chū wǒmen de nèixīn hé wàizài shìjiè.

Water is a natural mirror, reflecting our inner selves and the external world.

9. 河流汇聚成海洋，如同人类不同文化、不同背景的融合，共同构建美好世界。

Héliú huìjù chéng hǎiyáng, rútóng rénlèi bùtóng wénhuà, bùtóng bèijǐng de rónghé, gòngtóng gòujiàn měihǎo shìjiè.

Rivers converge into the ocean, just like the fusion of different cultures and backgrounds in humanity, building a better world together.

10. 水有时温柔，有时狂暴，如同我们的情感起伏，需要我们学会掌控。

Shuǐ yǒushí wēnróu, yǒushí kuángào, rútóng wǒmen de qínggǎn qǐfú, xūyào wǒmen xuéhuì zhǎngkòng.

Water can be gentle and violent, just like the fluctuations of our emotions, requiring us to learn how to control them.

From the above examples, it can be seen that most of the generated water metaphor sentences have the words "如" or "如同" as markers. These markers serve as indicators for water metaphors, enabling the system to quickly locate and generate metaphorical sentences. Although the generated sentences are correct, it gives the impression that these metaphors are in the same format, and then letting it generate them sometimes generates identifiers containing "像 like" and "像...一样 like...as", and the generated sentences have a serious stylistic uniformity, which is quite different from the water metaphors in the real corpus. Therefore the algorithms and models for metaphor generation have to be further optimized, which requires linguists to provide an exhaustive depiction of the metaphorical foundations and adopt a more optimized approach to metaphor generation.

IV. CONCLUSION

This article analyzes the clustering of source domains and target domains in conceptual metaphors, and explores the classification of water-related metaphorical source domains and target domains in Chinese, as well as the attribute features related to water in metaphorical expressions. By using the Chinese Conceptual Metaphor Dictionary (CCD) for semantic concept classification, it is found that there are 16 categories of target domains and 20 categories of source domains in conceptual metaphors. Water, as a natural substance, has the highest proportion in the source domains. The target domains related to the meaning and extension of "water" are identified. By applying the Word2Vec algorithm and similarity calculation, metaphorical sentences related to water can be generated. The language generation capability

of the ChatGPT language model is also tested, and further optimization is needed to provide reference for localized metaphor generation by machines.

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