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PHILOSOPHICAL ANALYSIS OF THE CONCEPT OF LABOR FROM THE PERSPECTIVE OF ARTIFICIAL INTELLIGENCE

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ABSTRACT

With the rapid development and widespread application of artificial intelligence technology, the concept of labor is undergoing unprecedented changes. The traditional concept of labor mainly revolves around human physical and mental labor, while the rise of artificial intelligence is gradually changing this situation. Robots, intelligent algorithms, and automation systems are replacing or assisting humans in completing many work tasks, which not only redefines the connotation of labor but also has profound impacts on the job market, labor productivity, and skill requirements. To better understand and respond to the labor transformation brought by artificial intelligence, traditional labor value theory needs to be updated to adapt to the new reality of the AI era.

KEYWORDS: *Evolution of labor concept; Labor value theory; Digital labor; Artificial Intelligence*

Currently, with the accelerating global new round of technological revolution and industrial transformation, the development and application of artificial intelligence are profoundly changing human production and lifestyle. Unlike the era of Marx and Engels, labor has shifted from physical labor to mental labor, with mental labor becoming increasingly prominent in the labor market. Examining the evolution of the labor concept and grasping the latest trends in labor forms is of great significance for upholding and developing Marx's labor value theory.

1. ETYMOLOGY ANALY

The character "劳" (Labor): Traditional Chinese character "勞". According to *Shuowen Jiezi · Force Radical*: "Labor means intense. From force and simplified form of 熒. Fire burning roof, those who use force labor. Burning roof refers to burning house. At this time those who use force labor most" (Xu, ca. 100 CE/1988, p. 700). It is formed by combining force and simplified form of 熒. 熒 represents fire disaster burning house, people using force to save from fire are very tired (Tang, 2018, p. 2036).

The main meanings of "劳" include: (1) Labor. As in *Mencius · Teng Wen Gong II*: "Some labor with their minds, some labor with their strength". (2) Diligent; hardworking. As in *I Ching · Dui*: "Pleased with the people, people forget their labor". As in *Guoyu · Yue Yu II*: "Labor without boasting of achievements". (3) Trouble; bother. Yao He's poem *Reply to Meng Attending Officer's Early Morning Visit*: "Lazy yet troubled to ask, climbing mountain has old ladder". (4) Merit. Han Yu's *Epitaph for Tai Yuan Prefecture Assistant Officer Miao Jun*: "Assisted Jiangxi envoy with merit". (5) Illness. *Huainanzi · Spirit*: "Like and hate make people's hearts ill". Gao You's note: "Labor means illness". (6) Worry. *Book of Songs · Bei Feng · Yan Yan*: "Indeed troubles my heart". (7) Excessive use. *Guanzi · Xiao Kuang*: "When sacrificial animals are not overworked, cattle and horses thrive". Yin Zhizhang's note: "Excessive use is called labor". (8) Comfort. *Book of Han · Gu Yong Biography*: "Comfort officials of two thousand bushels". (9) Same as "耢". Name of farming tool made of thorns or vines without teeth for leveling soil, also refers to using this tool to level ground. *Qi Min Yao Shu · Plowing Fields*: "Level twice" (Xia & Chen, 2011, pp. 2569-2570, 2582).

In bronze inscriptions, "labor" has "廾" (double hands) below, "爵" (wine vessel) above, broken lines in middle like wine flowing out, representing using both hands to raise wine vessel to comfort and reward those who have labored with merit. Since the double pillar form above 爵 resembles ancient form of 熒(ying), it was mistakenly elaborated into the above ancient form. Thus, the ancient meaning of hands raising wine vessel was completely lost. The seal script inherited the ancient form and added force radical, becoming force plus simplified 熒. After evolving to clerical script it was written as 勞. Now simplified as 劳 (Gu, 2008a, p. 384).

Shuowen · Force Radical: "Labor means intense" (Xu, ca. 100 CE/1988, p. 700). "Intense": Traditional character "劇". *Shuowen · Force Radical*: "務 means urgent. Urgent means hurry. Those who use force especially strongly" (Xu, ca. 100 CE/1988, p. 700). Zhu Junsheng

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points out: "劇 is an erroneous form of 勮" (Zhu, 1983, p. 395). That is, 勮 was corrupted to 劇. The left part of 勮 is "豦". "豦 means fighting entangled without resolution". It describes degree of fierceness. Therefore, Duan's note says, from force and 豦, means "especially strong use of force". From this we can see 勮 means especially exerting effort (Tang, 2018, p. 2037). "務", according to *Shuowen*: "務 means urgent". Duan Yucai's *Notes on Shuowen Jiezi*: "Urgent means running fast. 務 means being hasty in matters". 務 means hurrying for something (Tang, 2018, p. 2987). From pictographic perspective, "labor" is closely related to word meanings like "diligent, hardship, merit, comfort".

"Motion": Traditional character "動". *Shuowen · Force Radical*: "Motion means action. From force, 重 gives sound". The original meaning is to carry on back (Gu, 2008b, p. 218). The main meanings of "motion" include: (1) Change from original position or state. Opposite to "static". *Book of Songs · Bin Feng · Seven Months*: "In fifth month locusts move legs". (2) Operation; action. *Mencius · Teng Wen Gong I*: "Will act throughout the year". (3) Use; employ. Su Shi's *Letter Advising Against Military Action on Behalf of Zhang Fangping*: "Since ancient times rulers like to use weapons". (4) Begin; initiate. (5) Move; change; shake. *Huainanzi · Spirit*: "Not moved by things". (6) Often; frequently. Zhuge Liang's *Memorial on Sending Out Troops*: "Discussing peace and planning, often citing sages". (7) Touch; affect (Xia & Chen, 2011, p. 966).

"Motion" is both ideographic and phonographic character. In bronze inscription *Mao Gong Ding*, "motion" is written as "童". "童" originally meant male slave. In bronze inscriptions, from 重 (a person with punishment mark on head carrying bamboo basket), from earth, meaning a person carrying heavy object standing on ground can carry it up. Ancient text added walking radical (辶), meaning motion. Seal script changed walking radical to force, indicating using force to carry things on back, 重 also indicating sound. After evolving to clerical script it was written as 動, now simplified as 动 (Gu, 2008b, p. 218). "Force", according to Xu Zhonghu's *Dictionary of Oracle Bone Inscriptions*: "Resembles shape of primitive farming tool lei. Perhaps because lei farming requires force, thus extended to mean force of strength" (Tang, 2018, p. 2985). From this we can see "motion" is related to using physical strength, exerting physical force.

Shuowen · Force Radical: "Motion means action. From force, 重 gives sound. Pronounced tu zong. Ancient text motion from walking" (Xu, ca. 100 CE/1988, p. 700). *Duan's Note*: "Action means rise". "From walking", Zhang Shunhui's *Brief Notes*: "When people rise they must walk, so ancient text motion from walking radical; movement must use force, so motion also from force" (Tang, 2018, p. 2036). We can see "motion" mainly means: action; movement.

"Labor-motion" is included in *Great Chinese Dictionary*, with meanings: (1) Operation; activity. *Zhuangzi · Yielding Kingship*: "Spring plowing planting, body sufficient for labor-motion". Now mostly refers to activities creating material and spiritual wealth. (2) Make uneasy; disturb, shake. *Records of Three Kingdoms · Biography of Zhong Hui*: "Disturb our borders" (Luo, 1990a, p. 717; He et al., 2015, p. 516). (3) Trouble; fatigue. Cao Zhi of Wei in Three Kingdoms' *Memorial on Chen Shen's Promotion*: "Why trouble imperial carriage to expose at borders!" (4) Similar to saying thank you, many thanks. Tang Wang Jian's poem *Replying to Yu Ruxi's Morning Snow Gift*: "Trouble to cut new pattern brocade again" (Luo, 1990b, p. 717).

In *The Great Dictionary of the Sea* Economics Volume, labor has two meanings. First, in the context of political economics, labor means: people's purposeful activity of changing labor objects to suit their needs. That is, the expenditure or use of labor power (Xia & Chen, 2003, p. 4). Second, in the context of labor economics, labor means: people's purposeful activity of using certain production tools to act on labor objects, creating use values to satisfy human needs. Under market economy conditions, labor mainly participates in production activities as a factor of production (Xia & Chen, 2003, p. 369). In *New Compilation of Ancient and Modern Chinese Dictionary*, labor's ancient meaning was: "trouble; activity; make uneasy". Today it retains the meaning of "trouble" and adds three meanings: (1) human activity creating material or spiritual wealth; (2) physical labor; (3) engaging in physical labor (Yuan, 1994, pp. 703-704).

The term "labor" has long existed in Chinese classical works, however its commonly used connotation today was introduced and enriched from Japan during the process of learning from the West in modern times. "Labor" once referred to a class of people, namely workers, worker groups, this group even formed its own "society", especially the lower society (Liu, 2017, pp. 22-31). With the spread of anarchism, Marxism and other new thoughts, "labor" gradually shifted from negative meanings of humble and passive to positive meanings of sacred and glorious. Among them, under the promotion of modern Chinese anarchism, "labor" gradually became generalized. Agricultural and factory production activities, intellectual creation activities were all incorporated into labor. In 1918, Cai

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Yuanpei gave a speech - "Labor is Sacred": "Anyone who uses their own labor power to complete work beneficial to others, whether using physical or mental power, is labor... Labor is sacred!" (Ma, 2020, pp. 1-22). This was a high affirmation and praise of labor, where physical laborers and mental laborers each contribute according to their abilities with equal status, which was a breakthrough from the traditional view that "those who labor with their minds govern others, those who labor with their strength are governed by others". This speech by Cai Yuanpei not only promoted the transformation from the concept of "all four classes are scholars" to "all four classes are workers", but also further promoted the transformation of labor concepts and practices during the May Fourth Movement period.
Evidently, initially "labor" mainly meant operation, activity; trouble; disturbance and other meanings. With social development, the concept of labor gradually became enriched, deriving meanings referring to "a class of people" as well as today's commonly used meaning of "human activity creating material or spiritual wealth".

2. HISTORICAL EVOLUTION OF THE "LABOR" CONCEPT

###2.1 The Labor Concept in Agricultural Civilization

Ancient labor concepts differed from modern ones and did not carry political economic significance. In ancient times, labor's main meaning was physical activity. In medical texts, "labor" was used to refer to exercising the body, moving the body. As early as the pre-Qin period, the term "labor" had appeared. *Zhuangzi · Yielding Kingship* states: "Spring plowing planting, body sufficient for labor-motion". Here "labor" referred to activity, work. In ancient times, "labor" referred to physical activities engaged in by lower-class people, thus people once viewed only physical labor as labor. The ancients said: "Work at sunrise, rest at sunset". Since ancient times, Chinese people have been hardworking and diligent, creating a brilliant agricultural civilization. Meanwhile, scholars and literati wrote poems and painted, using these to praise labor and laborers, expressing sympathy for working people. As the mainstream thought of China's feudal society - Confucianism, although it attached great importance to agriculture and people's livelihood, in the feudal society led by "scholars", the status of physical laborers was relatively low. In ancient times, laborers were at the bottom of society, enslaved and exploited by a minority ruling class, leading to phenomena like "gentlemen labor with their minds, petty men labor with their strength, this is the system of former kings" and "those who labor with their minds govern others, those who labor with their strength are governed by others". Until modern times, the term "mental and physical labor" was still commonly used. Liang Qichao and Sun Yat-sen used "physical labor" to mean "labor". Overall, in ancient China, "labor" was related to physical activity and physical work, containing meanings of hardship and toil.

In Western discourse, the English word "Labor" mainly means: (1) work, especially heavy physical work; laborers, especially physical laborers. (2) childbirth. (3) Labour Party. (4) work hard, do something with effort (Oxford University Press, 2005, p. 747). The German word for Labor is "Arbeit", and both contain meanings of toil and fatigue. Cicero in *Tusculan Disputations* said: "There is still some distinction between labor and pain. On one hand, labor refers to the consumption of mental or physical power in work, or a duty that is stricter than usual; on the other hand, pain is an unpleasant movement of the body, and an annoying emotion" (Cicero, 45 BCE/2021, p. 79). From this we can see that labor includes both mental and physical labor expenditure. Moreover, not only in English but in various other European languages, "labor" refers not only to drudgery but also has the meaning of pain caused by childbirth (Arendt, 2007, p. 144). Evidently, in Western discourse, the verb "labor" refers to heavy physical labor and contains negative meanings like toil and pain. However, overall, Western labor concepts were equally complex, with both aspects praising labor and aspects looking down on labor.
In the Homeric era, the word labor had mythological overtones, with labor originating as divine punishment. In *Works and Days*, labor was Zeus's revenge on humanity. Due to Prometheus stealing fire and successfully deceiving Zeus by allocating bones to the gods and beef to humans, Zeus used labor as content of revenge against humans. Although labor was divine punishment for humans, in Hesiod's view, labor not only could obtain wealth and thus avoid hunger, but could also receive divine favor. Therefore, he believed that labor was sacred and sublime, labor was not shameful, laziness was shameful (Hesiod, ca. 700 BCE/1997, p. 10).

In ancient Greek times, the term physical labor was highly pejorative at the time, and we would only see such work praised in very rare cases (Theocarakis, 2010, pp. 7-37). Due to the widespread use of slaves and development of commerce, nobles gradually no longer condescended to engage in labor, and labor was almost restricted to the slave class and viewed as menial work that humans had to do unwillingly for survival. At this stage, agricultural labor was viewed as one of the noble professions, not only strengthening physique but also shaping good citizens, thus befitting citizen status. Therefore, except for agricultural workers, groups such as slaves (working for others), craftsmen (daily labor damaging body and soul), and merchants (excessive pursuit of wealth) were all despised. Plato made positive analogies with skilled craftsmen many times, but in his own value hierarchy system, he ranked handicraft skills very low (Finley, 1973/2021, p. 115). In Aristotle's view, leisure was higher than labor. Slaves, craftsmen and other physical laborers did not have leisure, only upper-class nobles who did not engage in labor were qualified to have leisure to engage in political life. The nature of slaves made them unable to be independent and self-sufficient (Aristotle, ca. 350 BCE/2011a, p. 190), they were strong and suitable for labor, and not suitable for political life. Although Aristotle acknowledged that craftsmen and servants were needed for the polis, he also pointed out that they were merely "menial workers necessary to maintain polis life" and should not be made citizens of the polis (Aristotle, ca.

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350 BCE/2011b, p. 130). Evidently, except for engaging in agricultural labor and political activities, other labor activities were all viewed as lowly activities.

In the Middle Ages, labor was a religious concept. In *Genesis*, "labor" was God's punishment for humanity. God created Adam from dust, not only placed him in the Garden of Eden, but also prepared work for him (Kuang, 2010, p. 183). Later, God also prepared a companion for Adam - Eve. Because Adam and Eve ate the fruit of knowledge of good and evil under the snake's temptation, God punished all three separately. Among them, God said to Adam: "...cursed is the ground because of you; through painful toil you will eat food from it all the days of your life", "By the sweat of your brow you will eat your food until you return to the ground..". (Kuang, 2010, p. 267). This meant that man must toil all his life and work desperately to survive. Since then, "labor" in the Middle Ages was viewed as God's punishment for humanity, one way for humans to atone for sin, closely related to meanings of toil and fatigue. Additionally, before "labor" became a form of punishment, God had already arranged labor for humans in the Garden of Eden, therefore, from another perspective, "labor" was a duty God bestowed upon humanity, connecting humans with God. This laid the foundation for the positive turn of labor concept's negative connotations.

In summary, the concept of labor has been associated with "original sin", "redemption", "toil", and "lowliness" since ancient Greece. It wasn't until the Middle Ages that the concept of "labor" began to gradually shift toward positive meaning. From the 16th century onward, driven by Martin Luther and Calvin's religious reforms, labor's status gradually improved. Labor became a sacred divine profession bestowed by God upon humanity - actively engaging in labor meant obeying God's calling, thus labor became humanity's divine calling with sacred significance.

2.2 The Labor Concept in the Industrial Revolution Era

During the Industrial Revolution period, traditional agricultural labor, household handicraft labor, and workshop labor transformed into factory labor. At this time, labor forms were mainly physical labor. Marx's examination of the "collective worker" also mainly focused on physical labor. With the establishment of division of labor and capitalist mode of production, workers sold their labor power as a commodity to capitalists, and laborers became part of the assembly line, engaging in unified, specialized work. Meanwhile, labor was no longer self-sufficient but produced for exchange purposes to obtain income by producing for others. In the labor process, laborers possessed, controlled and used labor materials but could not autonomously face labor products, suffering cruel exploitation from capitalists, and labor alienation occurred. Workers' creativity and individuality were suppressed, and labor became mechanized and an external compulsory activity.

Adam Smith developed the labor theory of value, promoting the transformation of the "labor" concept into an economic category. William Petty proposed that "the value of all things should be measured by land or labor" (Petty, 1662/2010, pp. 39-40). Building on this foundation, Smith systematically expounded his labor theory of value. First, Smith acknowledged that labor determines value, pointing out that "labor is the real measure of the exchangeable value of all commodities. The real price of everything, what everything really costs to the man who wants to acquire it, is the toil and trouble of acquiring it" (Smith, 1776/2007, pp. 70-71). "Labor is the only universal and accurate measure of value, that is, labor is the only standard by which we can compare the values of different commodities at all times and places" (Smith, 1776/2007, pp. 86-87). Second, Smith pointed out that in any society, the price of commodities consists of wages, rent, and profit, or one of these. Third, Smith initially distinguished between productive and unproductive labor as well as simple and complex labor.

Regarding productive and unproductive labor, Smith observed that although both involved labor, their effects on wealth accumulation differed. The labor of hired workers could bring wealth to employers, while servants' labor could only maintain employers' survival and life, unable to bring additional wealth; conversely, employers needed to spend part of their wealth to maintain servants' labor. Thus, Smith termed labor that acts on objects and can increase their value as productive labor, while labor that does not increase value as unproductive labor (Smith, 1776/2007, pp. 724-725). Regarding simple and complex labor, he believed that if one type of labor was more arduous and required more skill and intelligence than another, the products of the former would have higher value. In one hour, products of more arduous labor could be exchanged for twice the products of less arduous labor (Smith, 1776/2007, pp. 110-111). It can be said that since Petty proposed that labor determines value, the labor theory of value began to emerge and was further developed through Smith's exposition. Subsequently, David Ricardo inherited and developed Adam Smith's labor theory of value, initially laying the foundation for the labor theory of value.

From this point, labor in classical political economics was viewed as the measure of all commodity exchange values, meaning labor determines value and is also the source of all social wealth creation. From this point, the value of labor gradually gained recognition, and its status also progressively improved.

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Hegel studied the labor concept from a philosophical category, elevating the labor concept from political economics to a philosophical level, proposing that "labor creates human self-consciousness". He believed human labor fundamentally differed from animal labor: animals satisfy their survival needs based on instinctive desires by destroying natural objects to maintain their lives; humans objectify themselves in products through labor, not only creating connections between humans and nature, humans and humans, but also realizing human power itself. On one hand, Hegel believed labor was an activity where humans, under the influence of needs and will, based on division of labor using tools to eliminate the in-itself nature of objects, thereby creating items that satisfy both their own needs and others' needs. In this process, private labor transforms into social labor through exchange. Therefore, labor is also a social activity, an activity that maintains relationships between people. On the other hand, Hegel pointed out that "labor is restricted or regulated desire, that is, delayed satisfaction of disappearance, in other words, labor cultivates things" (Hegel, 1807/1997, p. 130).

The master places the slave between himself and objects, requiring the slave to process and transform objects, while the master enjoys the slave's labor fruits, thus successfully satisfying the master's material desires. However, the master, by relying on the slave's labor for survival, conversely becomes dependent on the slave's position. "Before the master, the slave feels that being-for-self is only external or irrelevant to himself; in fear he feels that being-for-self is only potential; in cultivating things through labor, being-for-self becomes his own, and he begins to realize that he himself exists in-and-for-itself" (Hegel, 1807/1997, p. 131). In other words, the slave originally believed self-consciousness did not belong to himself but only to the master; through fear of death and the supreme master, and through the labor process, the slave's suppressed self-consciousness gradually awakens, transforming from possibility to reality. In particular, through labor, the slave becomes aware of his labor's survival value for the master and his own position as a slave, realizing his own existence as independence. Thus, we can see the importance of fear and labor, especially labor, in the slave's realization of his being-for-self existence. Overall, in Hegel's view, labor cultivates things, and humans can achieve self-consciousness awakening through labor. Marx critically developed Hegel's view of labor, arguing that labor is neither abstract spiritual activity nor sensuous intuition or profit-seeking activity, but rather a sensuous objectifying social activity, an objectification of human consciousness, also humanity's unique life activity, the fundamental distinction between humans and animals. "As soon as humans begin to produce their means of subsistence, taking this step determined by their physical organization, humans begin to distinguish themselves from animals" (Marx & Engels, 2009, p. 519). In this process, humans not only produce the necessities of life for their survival but also indirectly produce their real life itself, including material civilization, spiritual civilization, etc. Animals produce only for survival, while humans are different; humans know how to produce according to "aesthetic measures", that is, according to principles unifying regularity and purposefulness. Therefore, Marx identified purposeful, conscious productive labor as the fundamental distinction between humans and animals.

Moreover, labor is not only the foundation of human society's existence and development but also the driving force of human historical development. In the labor process, not only is the relationship between humans and nature formed, but relationships between people are also created, that is, social relationships are formed in the process of productive labor and communication. With the further development of labor productivity, the application of large-scale industrial production modes and universal communication ultimately promote the formation of world history. From this point, the contradictory movement between productive forces and relations of production unfolds and runs throughout human social development. Among these, the continuous transformation of productive labor methods drives the improvement of labor productivity, continuously promoting the evolution of human forms: primitive society, slave society, feudal society, capitalist society, and future communist society. Therefore, Marx pointed out that "the entire so-called history is nothing but

the process of human birth through human labor" (Marx & Engels, 1979, p. 131).
Furthermore, labor is the manifestation of human essence, the embodiment of autonomy and creativity. "Labor is first of all a process between human and nature, a process by which human, through their own activity, mediate, regulate and control the material exchanges between themselves and nature" (Marx & Engels, 2009, p. 107), "it is human's becoming for themselves within the sphere of alienation or as alienated humans" (Marx & Engels, 2009, p. 205), it is a material objectifying activity where real humans recognize and transform the objective world and create products to satisfy their own needs. In this process, humans externalize their essential powers in the objective world, confirm their own existence, affirm themselves, and fully develop their talents. Meanwhile, while transforming the external world, they are also changing themselves. Therefore, labor is also the process of human self-becoming, development, and transcendence. In short, labor is human's species-essence, the manifestation of autonomy and creativity.

However, under the capitalist system, laborers sell their labor power to capital, labor is no longer the manifestation of human essential power, namely subjectivity and autonomy, but becomes alienated. Regarding this, Marx critically analyzed alienated labor at the philosophical level, pointing out the connotations of alienated labor: First, humans are alienated from their labor products. Labor products should be the objectification of human labor, the manifestation of human essential power. However, under capitalist conditions, labor products become an alien force opposing workers; the more workers produce, the poorer they become. Second, humans are

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alienated from their labor activity. Humans do not affirm themselves in labor but deny themselves. Third, humans are alienated from their species-essence. Labor is no longer the manifestation of human essence but becomes a means for wage workers to maintain survival. Fourth, humans are alienated from humans. In this process, a seemingly equal but essentially unequal wage labor relationship - oppression and exploitation - is formed and produces two opposing classes - bourgeoisie and proletariat.

Marx profoundly expounded the labor theory of value and pushed it toward maturity. Building on the foundation that labor determines value, Marx further questioned what kind of labor creates value, why and how it creates value, and established the dual nature of labor, pointing out that concrete labor and abstract labor are two sides of the same coin. Concrete labor forms the use value of commodities, it is mainly productive activity using natural materials as means of production, expressing the relationship between humans and nature; abstract labor forms the value of commodities. That is, the dual nature of labor determines the two factors of commodities - commodities have both use value and value properties. Regarding Smith's view that commodity value originates from rent, profit and wages or one of these, Marx took a critical stance. Smith confused wages with labor power value, thus believing surplus value like rent and profit came from land and capital, viewing the source of surplus value as wages, rent and profit. Marx pointed out that wages are only part of the value created by workers' labor, the true source of commodity value is labor, further speaking it is the crystallization of general human labor, determined by the socially necessary labor time spent in the labor process.

Meanwhile, Marx deeply analyzed the capitalist mode of production, revealing the secret of capitalist exploitation and labor's key role in capital appreciation. He pointed out that labor power as a special commodity is the prerequisite for surplus value production, the value created by workers exceeding the compensation for labor power value and appropriated by capitalists without compensation, that is, the crystallization of workers' surplus labor, is the source of surplus value. This directly pointed out that capital appreciation is achieved based on exploiting and squeezing workers. Specifically, under capitalist wage conditions, wage workers suffer both physical and mental torture in labor, at this time labor is not a free and unrestrained activity, but work that makes people feel pain and depression wanting to escape. "Labor is external to the worker, that is, does not belong to his essence; therefore, he does not affirm himself in his labor, but denies himself" (Marx & Engels, 2009, p. 159).

Free labor is Marx's ideal form of labor, and also the sublation of alienated labor. Marx pointed out that alienated labor makes people lose their human essence, only in the communist period can people be liberated from labor. By then, public ownership of means of production determines that all members of society jointly possess and use means of production, jointly possess labor products. The purpose of production also undergoes fundamental change, no longer endlessly extracting surplus value in pursuit of high profits. Meanwhile, division of labor no longer has compulsory and oppressive nature, "no one has a special sphere of activity, but everyone can develop in any department" (Marx & Engels, 2009, p. 537), people can freely and equally choose division of labor based on their interests and talents, engaging in various creative activities. By then, labor not only becomes life's first necessity but also an extremely serious and intense self-realization activity, where people not only demonstrate their talents in labor but also gain self-confirmation in labor. In short, in communist society, humans will end the history of slave-like submission to compulsory division of labor, labor not only sheds its nature of making a living, no longer becoming a heavy burden, but becomes a free and unrestrained activity, fully manifesting human subjectivity.

In summary, Marx's analysis of the labor concept mainly manifests in several aspects: On one hand, labor is not only the distinction between humans and animals but also the foundation of human society and historical existence and development, and more importantly the manifestation of human species-essence. However, due to the emergence of private ownership, labor became alienated. On the other hand, labor is also the source of value; surplus labor under capital employment is the source of creating surplus value. Marx's labor concept is both an affirmation of labor value and a transcendence of past value concepts that devalued labor. Before the Industrial Revolution, labor forms were mainly manual operations, with relatively low labor productivity. During the Industrial Revolution, with the application of machines, labor demonstrated huge economic benefits. Relying on mechanized mass production and division of labor, labor productivity was greatly improved. Marx pointed out: "What distinguishes different economic epochs is not what is produced, but how it is produced, by what labor means it is produced" (Marx & Engels, 2009, p. 210). The advancement of labor tools significantly improved labor productivity and created massive social wealth, that is, the economic value of labor gradually emerged, and from this point the value of labor gradually gained social attention and recognition.

3. NEW INTERPRETATION OF LABOR CONNOTATION IN THE AI ERA

3.1 New Connotations of Labor

Under the drive of the digital revolution characterized by digitalization and intelligence, the digital economy has become a new economic form following the Industrial Revolution. The development of digital technology is gradually changing people's ways of life and production; labor breaks through spatial constraints, and the boundaries between work and life are increasingly blurring. Meanwhile,

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labor forms have undergone significant changes: from mainly physical labor to mainly mental labor. Artificial intelligence, cloud computing, blockchain and other digital technologies are increasingly crucial in productive labor, and have given birth to new labor forms - digital labor. Currently, domestic and international academia have different views on the concept of "Digital Labor".

Terranova Tiziana first proposed "digital labor", pointing out that "free labor on the net is voluntarily given and unwaged, enjoyed and exploited, including building websites, modifying software packages, reading and participating in mailing lists, and building virtual spaces in MUDs and MOOs" (Terranova, 2000, pp. 33-58). In other words, whether internet users' purposeful behavior of building virtual spaces or voluntary, unpaid labor are manifestations of digital labor. Christian Fuchs pointed out that internet users "are both consumers of information and prosumers - productive consumers", "all forms of paid and unpaid labor required for the existence, production, dissemination and use of digital media should be included in the scope of 'digital labor'" (Fuchs, 2014, pp. 280, 296).

Currently, domestic academia has three different views on the definition of digital labor mainly centered around "whether prosumer labor is digital labor" (Shi, 2021, pp. 15-23). As Marx said: "What distinguishes the worst architect from the best of bees is this, that the architect raises his structure in imagination before he erects it in reality". Furthermore, "the simple elements of the labor process are: purposeful activity or labor itself, the object of labor, and the means of labor" (Marx & Engels, 2009, p. 208). "The essence of the labor process lies in productive useful labor creating use values" (Marx & Engels, 2009, p. 227). Regarding this, digital labor is defined as activity where laborers use digital technology tools to transform traditional production materials or digital production materials "to make predetermined changes to labor objects" (Marx & Engels, 2009, p. 211), producing digital products or services with use value. While the data generated from internet users' browsing, sharing, shopping and various activities is not only fragmented and chaotic but also not the main purpose of users going online, this chaotic raw data needs to be collected, analyzed and developed by data collectors, data analysts and data engineers to produce products with use value. In essence, whether from labor's purpose or labor's results, internet users' clicking, browsing and sharing behaviors should be viewed as activities, not labor.

Evidently, in the AI era, labor means and labor objects have undergone new changes, requiring reinterpretation and understanding of "labor".
Firstly, workers' autonomy and flexibility in labor have increased. In the digital economy era, with the development of cloud computing technology, labor tools are increasingly becoming digital and cloud-based. The application of digital platforms breaks the physical space limitations of labor, making the labor process highly elastic and flexible. Workers who master advanced scientific and technological knowledge and possess digital skills can use cloud service platforms to achieve cross-regional online document editing and video conferencing. To some extent, workers can freely and autonomously choose when, where, and how to work for whom. In essence, labor is no longer limited to specific times and places, becoming more flexible. Additionally, workers change their subjective world while transforming the objective world. Workers can engage in creative activities with the help of generative AI, enhancing the creativity of intelligent labor.

Secondly, labor means are becoming increasingly intelligent, digital, and green. Labor tools, as extensions of human body organs, play an important role in labor production and occupy a central position in labor means. Labor tools evolved from stone tools, bronze to iron tools in the agricultural age, from manual operation machinery, mechanical tools, electric mechanical tools to automated mechanical tools until contemporary digital intelligent tools in the industrial age (Feng & Shen, 2024, pp. 3-17). The application of machines not only enhanced humanity's ability to conquer nature but also increased demands on natural resources, thus while the Industrial Revolution brought massive increases in social wealth, it also caused serious environmental damage (Qi, 2024, pp. 77-82). Today, labor tools are innovating and upgrading toward digitalization, intelligence, and integration. These tools not only possess high productivity but are also environmentally friendly, paying more attention to green production. On one hand, platform-based labor means based on big data, cloud computing, and other technologies can improve capabilities in data collection, processing, training, and iteration, thereby promoting further concentration of means of production. Digital platforms can not only achieve intelligent data analysis and real-time sharing, enhancing data accuracy and real-time performance, but also provide application scenario foundations for intelligent decision-making. On the other hand, intelligent production means rely on the application of intelligent algorithms, robots, and visual recognition systems to achieve precise control, online detection, and efficient production of the production process. Compared to traditional machines, intelligent robots act more nimbly and flexibly. For example, industrial robots like welding robots and assembly robots, although appearing as mechanical arms or legs, move agilely and can complete precise grasping tasks under pre-input code instructions, and with the enhancement of visual recognition systems, can achieve 24-hour uninterrupted automated, process-oriented, and efficient production.
Thirdly, the types and forms of labor objects continue to expand. Technological progress has enhanced humanity's ability to understand and transform the world, improving the breadth and depth of opening up, utilizing, and creating resources. More new labor objects are being excavated, created, and incorporated into the scope of labor objects, weakening resource scarcity's constraints on development. Specifically, new resources substitute originally scarce resources and enable full utilization of resources that were previously

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inefficiently used due to technological limitations. This means originally scarce resources find new substitutable resources, and previously inefficiently used resources can be fully and efficiently utilized, to some extent helping alleviate resource bottlenecks in economic development. Labor objects have transformed from traditional physical forms to virtual forms. Currently, data has become another important new production factor following land, labor, capital, and information technology. The importance of data factors is increasingly prominent in the intelligent era, and the breadth and depth of data development and utilization are becoming core elements of enterprise competition. Among these, data factors have characteristics of openness, shareability, and non-depletion. First, data sources are broad and diverse, with any information potentially becoming an object of data collection. Thus, workers mine and integrate raw data, transforming chaotic and disorderly data into valuable data, thereby supporting digital product production. Second, data can be commonly used across time and space by multiple subjects. Unlike the exclusivity of materialized means of production, data can be shared in real-time through networks, and its value increases with the degree of sharing. Third, data can be reused without affecting its use value. Unlike traditional production factors, data factors are not consumed one-time after participating in the transfer of old value and creation of new value in the labor process, but can still be repeatedly used after use; moreover, with the increase in platform users, platform data will produce cumulative effects. For instance, databases that store and manage data not only contain large amounts of text, images, and video information that can be used multiple times, but also continuously integrate and iterate based on deep learning.
In summary, under the digital wave, means of production are further concentrated and promote the socialization of production, with collaboration becoming more extensive and division of labor more detailed. Workers have transformed from direct actors on production objects to operators of intelligent devices indirectly participating in productive labor, showing a phenomenon of "human-machine collaboration". Meanwhile, with the digitalization and intelligence of means of production and labor objects, the mode of labor production also shows intelligence and digitalization. Intelligent production equipment is deeply embedded in production, logistics, and other links. Particularly, the application of intelligent machines reduces the demand for worker numbers, showing characteristics of "unmanned" and "de-humanized" labor processes.

3.2 New Changes in the Labor Market

Technological progress is a "double-edged sword" for the labor market. During the Industrial Revolution, on one hand, the increase in technological factor inputs promoted the advancement of production machines. Mechanized production could effectively optimize resource allocation and improve production efficiency, allowing production workshops to complete production operations with only a small number of personnel, thereby reducing the demand for human factors. On the other hand, the emergence of steam engines, internal combustion engines, and generators promoted the development of industries such as textile, coal, oil, automobiles, and aircraft, creating new employment positions absorbing large amounts of labor force.

From 2023, about 75% of companies hope to adopt technologies such as big data, cloud computing, and artificial intelligence in the next five years (WEF, 2023a). As AI technology gradually applies to manufacturing, healthcare, transportation, and other fields, the labor employment market will undergo important reforms, not only increasingly emphasizing workers' creativity, technological literacy, and other qualities but also significantly impacting workers' income.

First, the application of artificial intelligence has both negative employment substitution effects and positive employment compensation effects on the labor market. On one hand, AI technology is gradually replacing simple, repetitive or mechanical, laborious physical labor as well as simple, non-creative mental labor on a large scale. Most domestic and international scholars believe that AI technology's substitution effect is low for high-skilled and low-skilled workers, but has a greater impact on medium-skilled workers (Wang, 2023, pp. 39-55). Driven by digitalization and automation, by 2027, record-keeping and administrative work positions will decrease by 26 million (WEF, 2023b). Although some of these positions require relevant work experience, they are now being replaced by artificial intelligence built on iterative technology of large language models. In this process, some workers may undergo re-education or training to improve their abilities to adapt to new position requirements, but some workers may face short-term unemployment due to lacking professional qualifications for high-skilled labor positions. However, this does not mean that artificial intelligence's employment substitution effects are all negative. Intelligent robots can engage in some dangerous, heavy, or assembly line positions that humans cannot or are unwilling to engage in, such as high-temperature or highly corrosive environments, thereby extending and amplifying human physical organs or compensating for human physiological limitations or deficiencies. Therefore, this substitution can not only fill vacancies in some work positions but also help liberate humans from dangerous, heavy, or monotonous boring work positions.

On the other hand, the application of artificial intelligence will give birth to new business forms and industries, thereby creating new employment positions absorbing labor force. On April 1, 2019, the Ministry of Human Resources and Social Security, State Administration for Market Regulation, and National Bureau of Statistics released information on 13 new occupations including artificial intelligence engineering technicians and big data engineering technicians, these positions derived from China's industrial structure transformation and upgrading driven by AI, Internet of Things, and big data technologies (Ministry of Human Resources and Social

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Security et al., 2019). With the development of artificial intelligence technology, future global labor market demand for artificial intelligence and machine learning experts is expected to increase by 40%, that is, 1 million job positions. China's growth demand for employment positions such as data analysts and scientists, big data experts, business intelligence analysts, database and network professionals, and data engineers will approach 45% (WEF, 2023c). Therefore, with the development and application of AI technology, the labor market still has a huge shortage of high-tech professionals, and artificial intelligence talent demand covers multiple fields including computer vision and natural language processing.

Second, with the transformation of employment positions, labor skill structures and workers' income will also undergo corresponding changes. On one hand, with the application of AI technology and the increasing intelligence and automation of labor processes, workers' technological literacy, creative thinking, analytical thinking, and lifelong learning abilities are becoming increasingly important in the labor market; workers' operational skills are declining in status in the labor market. Therefore, workers should strengthen their vocational skills training and education, through which artificial intelligence may become an opportunity rather than a threat. On the other hand, artificial intelligence's crowding-out effect and creation effect are beneficial for high-income groups' stable employment, while low-income groups' unemployment problems become more serious, changing the labor force employment structure and widening the income gap between different skilled labor forces (Jiang & Zhang, 2021, pp. 58-68). The widening of labor income gaps will hinder the improvement of residents' consumption levels and living standards, and is more unfavorable to achieving the goal of common prosperity. This requires joint efforts from workers, enterprises, and the state to adjust.

Evidently, the application of artificial intelligence technology has impacted the labor employment market, workers' skill requirements, and income. China's *Digital Literacy and Skills Development Level Survey Report (2024)* shows that Chinese workers' ability to adapt to career development needs in the digital era is gradually strengthening, and citizens' digital literacy and skills improve with education levels (Cyberspace Administration of China, 2024). Although the application of artificial intelligence technology will cause some positions to decrease and pose threats of skill obsolescence, workers' employment positions are not simply replaced by artificial intelligence technology. When workers adapt to high-tech position work requirements through re-education and training, employment substitution transforms more into occupational transformation.

3.3 From Traditional Skills to Digital Skills

Technological progress and its deep integration with labor production promote continuous reform of production modes. Before the Industrial Revolution, workers' labor was an activity of simple physical labor using tools based on division of labor. After the Industrial Revolution, with the popularization of factory machinery and equipment, workers gradually transformed from direct actors on labor objects to supervisors and regulators of the production process. As Marx said: "Labor no longer appears as being included in the production process; rather, the human being comes to relate more as watchman and regulator to the production process itself" (Marx & Engels, 2009, p. 196).

In the AI era, as production machines become increasingly intelligent and digital, mass assembly line production methods are being replaced by intelligent, platform-based, and virtual production methods. Some simple physical and mental labor will gradually be replaced by intelligent machines, while the importance of innovative mental labor becomes increasingly prominent.
The intelligent era is in the process of iterating from traditional skills to digital skills. The agricultural age required high physical abilities from workers. Entering industrial society, on one hand, it emphasized workers' physical labor, requiring them to possess simple skills that could endure high-intensity single repetition on assembly lines; on the other hand, it also highlighted workers' complex mental labor, emphasizing technological literacy and innovation ability, generally requiring workers to "simultaneously exercise both physical and mental capabilities". Now in the intelligent economy era, society has higher requirements for workers' labor skills. First, with society's increasing demand for artificial intelligence technology and its applications, society's need for high-skilled workers who master digital technology and skillfully use digital tools has surged, such as AI software development and AI compiler development engineers. Therefore, it is particularly important in the intelligent era for workers to master digital skills, especially knowledge and skills related to computer programming and artificial intelligence. Second, as "human-machine collaboration" becomes a new way of working, workers' collaboration abilities are also increasingly important. Workers not only need to master basic operational skills but also need to master knowledge and technology in machine debugging, intelligent system operation, and maintenance.

It can be said that under the digital economy wave, society needs more high-quality compound workers, requiring them to master digital skills related to programming, data analysis and application, while also requiring high innovative thinking, communication skills, and management abilities. Therefore, in the rapidly changing artificial intelligence era, workers' creativity, digital literacy, and skills become increasingly important.

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4. NEW THOUGHTS ON LABOR VALUE IN THE ARTIFICIAL INTELLIGENCE ERA

4.1 Challenges to Traditional Labor Value Theory in the AI Era

Currently, with the advancement of a new round of technological revolution, production methods are advancing toward networking, digitalization, and intelligence. While artificial intelligence promotes industrial transformation and drives economic development, traditional labor value theory also faces many new problems and challenges, including views on "diversification of value creation sources", "artificial intelligence replacing humans to occupy the main position of labor", and "technological progress leading to unemployment".

1. Whether Artificial Intelligence Creates Value

In the AI era, the application of intelligent technology has given birth to automated production systems such as digital workshops, producing phenomena where large numbers of production workers "exit" from factories yet bring multiplied enterprise profits. This demonstrates productivity beyond traditional technology, again raising questions about traditional labor value theory regarding labor creating value. In digital workshops, the application of AI technology only adjusts the ratio between variable capital and constant capital, that is, the adjustment of input proportions within capital's technical organic composition, without changing the fact that machines and intelligent machines belong to the category of constant capital, namely materialized labor. They can only transfer their own value gradually to new products when combined with human living labor acting on labor objects, but do not create value. Furthermore, high enterprise profits are not created solely by intelligent equipment or merely by workers giving commands. In short, AI technology can assist humans in understanding the world, creating the world, and creating enormous social wealth, but in essence, it is a technological existence, an extension and supplement to human intelligence; it cannot create value.

1. Whether Artificial Intelligence Impacts Humans' Status as Labor Subject

The application of AI technology, especially the emergence of unmanned factories, makes workers' living labor's value creation method more concealed, mistakenly believing that intelligent machines replace humans and occupy the entire production process, thereby denying workers' subjectivity in the labor process. Currently, although artificial intelligence demonstrates amazing computational ability, logical reasoning ability, learning ability, etc., and conducts autonomous actions under instructions, "possessing", "controlling", and "acting upon" labor means in the labor process, it first cannot be separated from engineers' preliminary labor, and its labor tasks cannot be separated from human settings. Additionally, artificial intelligence's "creativity" does not possess emotions and experiences unique to humans but is based on algorithms and rules. In short, it does not possess self-consciousness and self-thinking, cannot possess true purposefulness and creativity, and its subjectivity has essential differences from human subjectivity. Artificial intelligence essentially remains the externalization and embodiment of human will and creativity.

1. Whether Workers Become a Useless Class

The development and application of artificial intelligence replaces human labor in many positions causing some workers' unemployment problems, which again raises discussions about "useless class" and "income inequality". The application of artificial intelligence brings unprecedented challenges to human labor rights. However, "unmanned workshops" are not truly unmanned; behind them are large numbers of technical research and development and control personnel. The operation of intelligent machines cannot be separated from the labor of the high digital-skilled working class. Moreover, the application of AI technology is giving birth to new positions such as intelligent research and development and machine programming, which will create demand for related high-skilled labor force with scientific and technological literacy and digital skills, prompting workers to continuously improve their labor quality to achieve "re-skilling". Therefore, artificial intelligence will not cause the working class to become a "useless class". Facing the phenomenon of social income inequality with technological progress, we need to be vigilant about capital's profit-seeking nature, regulate and guide healthy capital development, promote artificial intelligence development toward "good", and improve relevant policies to ensure workers' "reproduction" and achieve a more equitable wealth distribution mechanism.

In the artificial intelligence era, humans' living labor being the only source of value has not changed, workers' status as labor subjects has not changed and will not become a "useless class". What has changed is that technological elements represented by artificial intelligence are increasingly prominent in production, especially when embedded in the production process to optimize resource allocation, releasing enormous productive forces.

4.2 New Interpretation of Labor Concept in the Artificial Intelligence Era

Humanity is currently entering the Fourth Industrial Revolution represented by artificial intelligence and other new technologies. The principle of intelligent machines' application in improving production efficiency and economic benefits has similarities with traditional technology. AI technology can stimulate workers' imagination and creativity to a greater extent. The application of AI technology enables "AI + small labor input" to achieve enormous productivity. Specifically, the application of AI technology optimizes the labor force structure, with small labor input producing efficient productivity. As Marx said: "The creation of real wealth comes to depend less on labor time and on the amount of labor employed than on the power of the agencies set in motion during labor time, whose powerful

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effectiveness is itself in turn out of all proportion to the direct labor time spent on their production, but depends rather on the general state of science and on the progress of technology, or the application of this science to production" (Marx & Engels, 2009, pp. 195-196). Productive force is the ability to transform nature formed by combining people with labor capacity and means of production (Wu & Yu, 2020, pp. 36-45). The combination of new intelligent workers and advanced means of production will promote the improvement of productive forces. Supported by algorithms and computing power, artificial intelligence can store massive data, demonstrating super memory and networked search summarization capabilities. Through intelligent analysis, artificial intelligence can quickly and efficiently analyze and process data according to human requirements, thereby providing optimal solutions for humans. These solutions can provide useful reference for humans to understand and transform the world, maximizing the stimulation of human imagination and creativity, bringing leaps in economic benefits.

Furthermore, as an important engine of new productive forces, AI technology has great potential in improving labor productivity and promoting economic growth. The application of AI technology has led to new changes in how workers combine with means of production, showing "unmanned" characteristics. In agriculture, based on data collected by cloud platforms such as humidity, temperature, light intensity, and relying on BeiDou Navigation System, 5G technology, and AI recognition, it achieves all-weather real-time monitoring of farmland environments and high-precision, unmanned operations in plowing, planting, management, and harvesting through drones. It can even break away from the farmland environment, relying on fully intelligent control systems to achieve systematic planting, realizing industrial streamlined production without requiring sunlight and soil. Relying on AI technology is gradually realizing smart farming, and the application of "unmanned farms" and "unmanned plant factories" is gradually enabling workers to break away from harsh labor environments, achieving remote labor operations indoors through intelligent systems. In manufacturing, "lights-out factories" utilizing intelligent systems and robots have achieved unmanned or minimal-staffed labor, with the entire labor process showing de-humanization characteristics. On one hand, using cloud computing and big data technologies can efficiently integrate resources and optimize production processes, achieving completely unmanned operations throughout the entire production process. Production workshops only need a few intelligent robots to achieve efficient production. Additionally, generative AI can significantly improve the accuracy of identifying and correcting defects while reducing machine operation downtime. When intelligent equipment operation is interrupted, technical personnel can quickly locate and solve problems under the guidance and advice provided by AI large model intelligent Q&A systems, thereby improving workplace safety and reliability. On the other hand, AI technology has achieved harmony between economic and ecological benefits. Traditional technology had high demands for resources like coal and oil. For example, the application of steam engines brought about massive increases in social wealth for Western countries while also causing serious environmental pollution.

AI technology can promote research and development of new technologies and products, optimize resource allocation, thereby improving total factor productivity and promoting green economic development. Additionally, data as a new production factor plays an important role in intelligent production along with factors like knowledge and information. Its replicability, shareability, and other characteristics reduce human dependence on natural resources, making virtual production or virtual products possible, thereby reducing raw material use and waste. Therefore, AI technology reduces negative impacts on resources and environment while improving labor productivity. In the service industry, AI technology may cure the "Baumol's disease" of the service sector (Li, 2023, pp. 48-53), becoming an engine of economic development. In customer service, applying generative AI can improve problem-solving efficiency by an average of 14% when measured by problems solved per hour (Brynjolfsson & Li, 2023). Generative AI can not only automatically execute tasks and efficiently handle large amounts of repetitive tasks, but also integrate and analyze databases, formulate market plans, provide personalized marketing and services, improving service quality while reducing errors and operating costs. In healthcare, AI algorithms and deep learning technology can manage medical records, achieve medical image analysis, and make clinical diagnoses.
In summary, the development of artificial intelligence not only changes labor methods and social division and cooperation but also stimulates labor subjects' initiative and creativity. Compared to traditional technology, relying on cloud computing, deep learning, and other technologies, AI technology can gather massive data—concentrating historical and cultural information from around the world—and based on this, capture content to make judgments and decisions, providing planning solutions to assist human production and creation. This not only breaks through human brain memory capacity limitations but also surpasses human speed in extracting useful information from massive data, providing assistance for engaging in creative activities, achieving the goal of "low input-high output".

5. CONCLUSION

Artificial intelligence aims to achieve "human-like" goals by simulating human learning abilities, thinking abilities, and other capabilities, thereby becoming intelligent machines that can think and act like humans and serve human production and life. With the development of artificial intelligence, labor forms are undergoing new changes, with mental labor related to mathematical skills and creative activities becoming increasingly important. Understanding the evolution of labor concepts and interpreting new changes in labor and its impact on the labor force market in the intelligent era, adhering to the people-centered development concept, while

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leveraging artificial intelligence's economic benefits, we should coordinate technological progress with social imbalance issues, promoting labor liberation and humans' free and comprehensive development.

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