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A Comparative Study of Community Service Work between China and the United States Based on Deep Learning

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Abstract

This paper proposes a deep learning-based computational framework for comparative studies of community social work in China and the United States. Traditional comparative research predominantly relies on qualitative case analysis, which presents limitations in identifying macro-level, systematic patterns. To address this gap, we develop an integrated analytical framework leveraging deep learning models—including natural language processing, graph neural networks, and computer vision—to mine multi-source heterogeneous data such as community work texts, social networks, and community imagery from both countries. Through automated clustering of practice patterns, in-depth perception of community needs, and quantitative evaluation of intervention effectiveness, this study seeks to move beyond superficial descriptions and uncover similarities and differences in institutional logics, practice pathways, and cultural contexts between the two systems. By doing so, it aims to contribute a new paradigm for knowledge production and methodological innovation in social work within the context of globalization.

Keywords

Deep Learning Methods, GNN Model, Community Service Work, China and USA, Neural Networks

1. Introduction

Community social work represents a critical branch within the social work discipline, dedicated to enhancing the quality of life and social well-being of community residents through systematic intervention strategies. It emphasizes the use of participatory methods within specific geographical or functional communities to

identify and address social problems, promote the equitable allocation of community resources, and foster the sustainable development of community capacities. The scope of community social work typically encompasses community needs assessment, resource integration, organizational mobilization, policy advocacy, and capacity building. For instance, needs assessment employs quantitative and qualitative methods—such as surveys and focus groups—to identify vulnerable populations and their challenges. Resource integration involves coordinating governmental, non-profit, and market forces to provide educational, healthcare, and employment support. Organizational mobilization encourages resident engagement in collective action, such as forming community self-governance groups. Policy advocacy seeks to influence local or national decision-making to address structural inequalities. Capacity building enhances residents' self-help and mutual aid abilities through training and education. These components are interconnected, forming a comprehensive intervention framework aimed at achieving sustainable community development and resident empowerment. Ultimately, the core of community social work lies in linking micro-level individual issues with macro-level social structures to drive social transformation through collective action.

The distinguishing features of community social work are manifested in its systemic, participatory, pluralistic, and sustainable nature. Firstly, the systemic approach emphasizes viewing the community as a complex ecosystem where social, economic, and cultural factors interact. Interventions must therefore adopt a holistic perspective to avoid fragmented service delivery. For example, in addressing poverty, community social work extends beyond individual financial assistance to include educational enhancement, employment training, and the construction of social support networks, thereby forming multi-tiered solutions. Secondly, participatory practice constitutes the core characteristic, emphasizing residents' central role in problem identification, decision-making, and implementation. Through participatory methods such as community forums or democratic deliberation, residents strengthen their sense of control over community affairs, which helps cultivate social capital and collective efficacy. Pluralism is reflected in the methodological flexibility of community social work, which often integrates casework, group work, and community organization techniques to adapt to diverse cultural and contextual settings. Furthermore, sustainability requires that interventions not only address immediate issues but also focus on building long-term mechanisms—such as nurturing local leadership or establishing community funds—to ensure continuity beyond project cycles. These characteristics collectively render community social work a dynamic and adaptive methodology capable of effectively responding to complex challenges in rapidly evolving social environments.

The significance of community social work lies in its capacity to effectively promote social integration, enhance community resilience, and advance social equity and justice. From a societal perspective, by empowering residents and strengthening social networks, community social work helps reduce social exclusion and isolation, see (Milton et al., 2025) and (Ataizi, 2012). Particularly within contexts

of accelerated urbanization and social transformation, it can mitigate the negative impacts of issues such as population aging, immigrant integration, and concentrated poverty. For instance, in multicultural communities, community social work can facilitate cross-cultural dialogue and activities to promote mutual understanding and cooperation, thereby reducing conflict risks. Economically, it improves the utilization efficiency of human resources by providing skills training and employment support to help vulnerable groups integrate into the labor market, indirectly contributing to local economic development. Politically, community social work fosters civic consciousness and promotes grassroots democratic processes by advocating for resident participation in public affairs, thereby helping to construct more inclusive governance structures. Research indicates that regions implementing community social work often demonstrate higher social cohesion and risk resistance; for example, such communities recover more rapidly from natural disasters or economic crises. Consequently, community social work serves not merely as a tool for addressing localized problems but as a vital pathway for achieving United Nations Sustainable Development Goals, such as reducing inequality and building inclusive societies.

Investigating community social work carries substantial theoretical and practical significance, see (Leal Filho et al., 2022; Deze et al., 2017; Fordham & Robinson, 2019). Theoretically, it contributes to the enrichment and development of the social work discipline by empirically validating and refining relevant theoretical models, such as social capital theory, ecosystem theory, and empowerment theory. For example, through comparative analysis of intervention cases across different communities, research can elucidate the applicability of community social work in multicultural contexts, thereby advancing cross-cultural social work theory. Furthermore, research in this field helps bridge the gap between micro-level practice and macro-level policy, providing a scholarly foundation for innovations in social governance. Practically, studying community social work offers evidence-based guidance for policymakers and practitioners, enabling optimized resource allocation and intervention strategies. For instance, evaluating the effectiveness of community social work in crisis response can inform the design of governmental emergency management plans. Additionally, as globalization and technological transformation intensify, communities face emerging challenges—such as the digital divide or environmental justice—that demand innovative social work methodologies. Research plays a crucial role in exploring effective practices in these nascent areas. In the long term, deepening inquiry into this subject not only enhances the influence of professional social work but also promotes societal well-being, laying the groundwork for sustainable community development. Thus, investing in research on community social work represents a high-return academic and societal endeavor.

Deep learning, a prominent subfield of machine learning, has achieved groundbreaking advances in artificial intelligence in recent years, see (Schmidhuber, 2015; Shiri et al., 2024). Its core principle involves constructing multi-layered neu-

ral network architectures to automatically learn hierarchical feature representations from data. Contemporary deep learning models have evolved from early convolutional and recurrent neural networks to the Transformer architecture based on self-attention mechanisms—a breakthrough that directly facilitated the development of large language models with parameter scales reaching hundreds of billions. These large models demonstrate three notable advantages: First, in representational learning capability, through self-supervised pre-training on massive unlabeled text corpora, the models capture complex grammatical structures, semantic relationships, and knowledge elements, forming high-quality linguistic representation spaces. Second, in generalization and transferability, benefiting from extensive parameters and rich prior knowledge, large models exhibit strong zero-shot and few-shot learning abilities, adapting to new task scenarios with minimal examples. Third, in contextual understanding and generation, leveraging attention mechanisms, large models effectively handle long-range dependencies, enabling high-quality text generation and sophisticated linguistic reasoning. These characteristics render large models highly effective in natural language processing, computer vision, and other multimodal tasks, providing a robust technical foundation for intelligent applications across diverse fields.

Integrating big data analytics technologies, such as large language models, into community social work research can significantly enhance the depth and efficiency of inquiry. Specifically, integration can be achieved through the following pathways: At the level of data collection and analysis, leveraging the natural language processing capabilities of large models enables deep mining of unstructured textual data in community work, including resident interview transcripts, community meeting minutes, policy documents, and social media content. Through techniques such as sentiment analysis, topic modeling, and semantic network analysis, researchers can systematically identify community need patterns, track the evolution of social issues, and quantitatively evaluate intervention effectiveness, see (Mienye & Swart, 2024; Choudhary et al., 2022). For example, longitudinal analysis of multi-year community service records may reveal cyclical patterns in specific social problems. In terms of methodological innovation, large models can facilitate the construction of intelligent decision-support systems for community social work. Such systems can integrate multi-source heterogeneous data—including demographic information, service utilization records, and environmental factors—and employ knowledge graph technology to establish associative networks among variables, thereby providing data-driven recommendations for intervention design. Furthermore, utilizing the generative capabilities of large models, community dialogue simulation systems can be developed to train social workers in adaptive response strategies across diverse scenarios. This technological integration not only improves the scientific rigor and precision of community research but also strengthens the preventive function of social work through predictive analytics, ultimately advancing community social work toward more intelligent and personalized directions.

2. Community Service Work between China and USA

2.1. National System and Governance Structure

First, the forms and functions of community work in China and the United States are rooted in their distinct state systems and governance structures. China's political system is a unitary socialist state under the leadership of the Communist Party of China. Within this framework, the state directs social governance through a top-down administrative system. Community work, often termed "community building" or "community service", essentially functions as an extension of state administrative functions at the grassroots level. Urban "sub-district offices" and "community resident committees", as well as rural "village committees", though legally defined as self-governing organizations, in practice undertake numerous administrative tasks delegated by the government, such as population management, policy dissemination, social welfare distribution, and public safety maintenance. This model integrates China's community work closely with national governance objectives, with its core functions focused on implementing state policies, maintaining social stability, and providing public services. Resources are primarily allocated through government fiscal funding and project-based service procurement.

In contrast, the United States is a federal republic characterized by a distribution of power among federal, state, and local governments. This decentralized system has fostered a community work model led largely by civil society. The government, particularly at the federal level, sets broad frameworks and provides funding through legislation (e.g., the Fair Housing Act) and grants (e.g., Community Development Block Grants via HUD), but the actual delivery of services relies heavily on a vast and competitive landscape of nonprofit organizations and community development corporations. The relationship between these organizations and the government is contractual and partnership-based rather than administrative or hierarchical. Consequently, community work in the U.S. exhibits high degrees of fragmentation and specialization, driven by grassroots needs, social movements, and competitive resource acquisition. Its core tasks often revolve around community organizing, policy advocacy, and empowering specific vulnerable groups.

2.2. Historical and Cultural Contexts

The historical and cultural traditions of both countries provide deep-seated value orientations and sources of legitimacy for their contemporary community work. China's community practice is deeply influenced by Confucian collectivist culture and a long history of centralized bureaucratic governance. Confucianism emphasizes family values, social harmony, and respect for authority, shaping a community intervention logic oriented toward collective interests and inclined to resolve social issues through internal mediation rather than confrontational approaches. Furthermore, within the socialist tradition, the historical legacy of the "danwei system", though diminished, perpetuates a widespread expectation that the state

provides welfare and security, as it once tied individual welfare closely to one's work unit and place of residence. Thus, community work in China is regarded as a vital instrument for achieving the national goal of a "harmonious society". Its legitimacy derives from state authorization, emphasizing the promotion of consensus and stability within the existing institutional framework.

Community work in the United States is profoundly marked by its liberal tradition and the historical development of civil society. Its cultural foundations stress individual rights, limited government, and volunteerism. The tendency for citizens to form voluntary associations to address common problems, observed by Alexis de Tocqueville in Democracy in America, remains a core characteristic of American community work today. This tradition has given rise to a rights-based, more confrontational practice model. The legitimacy of community work stems not from the government but from the community members it represents and its mission to pursue social justice. From the Civil Rights Movement to the fight for environmental justice, community action is often viewed as a necessary means to counterbalance market failures and government power, safeguarding individual and group rights. Therefore, its core narrative is one of empowerment and transformation, rather than management and stability maintenance.

2.3. Deep Learning for Analyzing Social Work

Deep learning is a subfield of machine learning whose core lies in using computational models containing multiple processing layers (hence "deep") to learn and represent abstract features from data. These models, commonly referred to as deep neural networks, are loosely inspired by the connectivity of neurons in the human brain. Unlike traditional machine learning algorithms, which rely heavily on manual feature engineering—where domain experts manually design and select features from input data—deep learning models can automatically learn hierarchical features directly from raw data (e.g., characters in text, pixels in images). The lowest layers of the network learn elementary features (such as edges in images or part-of-speech tags in text), while subsequent, deeper layers combine these into more complex and abstract concepts (e.g., faces in images or sentiment and semantic themes in text). This end-to-end learning approach integrates feature engineering with model training, significantly reducing dependence on prior knowledge and enabling the discovery of complex patterns that human experts might overlook. More studies can be seen in (Ardichvili, 2013; Borzillo et al., 2011; Duguid, 2005).

The revolutionary success of deep learning in recent years stems from several key characteristics. First is its exceptional capability to process high-dimensional unstructured data. Traditional models often struggle with unstructured data like images, audio, and natural language, whereas the convolutional neural network (CNN) architecture in deep learning is inherently suited for capturing spatially local correlations in images. Recurrent neural networks (RNNs) and their variants, such as Long Short-Term Memory (LSTM) networks, excel at modeling

long-range dependencies in sequential data like text and time series. Second, deep learning models possess powerful representation learning capabilities. Through multiple layers of nonlinear transformations, they map raw data into a new feature space where underlying regularities and discriminative characteristics become more pronounced, substantially enhancing performance in subsequent tasks like classification and clustering. Finally, their performance typically continues to improve with increasing data volume. Unlike many traditional models that plateau after a certain data size, large-scale annotated data enables continuous optimization of deep network parameters, yielding more accurate and robust representations—a distinct scalability advantage in the era of big data.

Deep learning techniques have demonstrated performance surpassing traditional methods across a range of complex tasks, justifying their introduction into social science research. In tasks such as image recognition, speech recognition, and natural language understanding, their accuracy has reached or even surpassed human levels. In social work research, this can automate the identification of environmental features in community imagery or enable fine-grained categorization of large-scale case reports. Models based on advanced architectures like the Transformer can deeply understand contextual language, enabling high-quality machine translation, text summarization, and question answering. This provides a technical foundation for analyzing narrative structures and semantic differences in Chinese and American community work texts. One schematic figure to show the structure of the deep neural network is plotted in Figure 1.

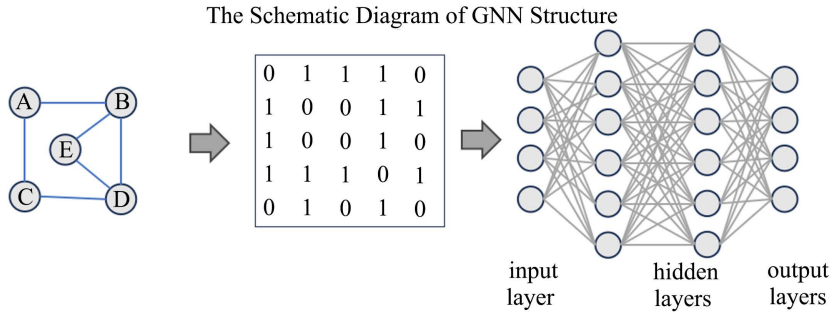

Figure 1. Deep neural network structure.

Graph Neural Networks (GNNs) can effectively process non-Euclidean data such as social networks and knowledge graphs, learning relationships between nodes and edges to uncover deep structures within networks. This makes them highly suitable for analyzing collaborative networks and resource flows among community organizations.

Compared to traditional methods, the core advantages of deep learning lie in its automation, scalability, and discovery power. It can process vast quantities of qualitative materials previously considered difficult to quantify, revealing latent, unanticipated complex relationships and dynamic patterns in a data-driven manner. This offers unprecedented potential for social science research, combining

macro-level insights with micro-level analysis.

3. Analysis and Applications

Our computational linguistic models are anticipated to yield a stark, quantifiable divergence in the thematic clustering of community practice discourse between the two nations. Analysis of Chinese corpora—encompassing policy documents, community service reports, and official narratives—is projected to reveal dominant clusters around lemmas such as "public service delivery", "Party-building guidance", "dispute mediation", and "targeted poverty alleviation/rural revitalization". These themes collectively depict a state-steered model where community work functions as a capillary extension of administrative governance, focusing on social integration, stability maintenance, and the implementation of national strategic agendas. Conversely, the American corpus, derived from NGO literature, grant proposals, and advocacy materials, is expected to exhibit a pronounced clustering around "community organizing and mobilization", "policy advocacy and lobbying", "racial equality", and "affordable housing". This thematic profile underscores a civil society-driven paradigm oriented toward confronting structural inequalities, amplifying marginalized voices, and contesting power dynamics through collective action.

The critical discussion emanating from this finding will interrogate how this data-driven bifurcation refines the classical theoretical dichotomy between "administrative" and "activist" social work. The results do not merely confirm the existence of these ideal types but provide empirical granularity regarding their specific operational foci. This divergence serves as a direct reflection of the foundational state-society relations and governing philosophies. The Chinese model, with its emphasis on top-down service provision and harmony maintenance, epitomizes a "state-led corporatist" framework where society is managed through hierarchical, state-sanctioned channels. The American model, with its focus on advocacy and mobilization, embodies a "pluralist" tradition where the state is one actor among many in a competitive arena of social interests. The deep learning output thus translates abstract political theory into tangible, comparable semantic patterns, demonstrating how macro-level political structures concretize into micro-level practice vocabularies.

The application of Graph Neural Networks to organizational and funding data is predicted to uncover fundamentally distinct topological structures in the community service ecosystems of China and the United States. In China, the network is hypothesized to manifest a "hub-and-spokes" or "core-periphery" structure, where key government entities—such as Civil Affairs Bureaus, street-level offices, and resident committees—occupy the central, highest-degree nodes. Resources, information, and authority flow radially from this administrative core outward to implementing agencies and community groups. This architecture ensures policy coherence and control but may also create bottlenecks and foster dependency. In contrast, the U.S. network is anticipated to be a decentralized, "distributed" structure with multiple, densely connected but non-hierarchical clusters centered

around large non-profits, community foundations, faith-based organizations, and advocacy coalitions. Resource flows are multiplex, involving competitive grants, private donations, and fee-for-service contracts, creating a more adaptive but also potentially fragmented and volatile landscape.

The discussion will delve into the implications of these network topologies for community agency and innovation. The Chinese model's centralized structure promises efficient resource deployment aligned with national priorities and enhances stability. However, it may inadvertently constrain grassroots autonomy and organic innovation, as local initiatives often require alignment with central nodes for legitimacy and support. The distributed American network, while fostering competition, specialization, and niche advocacy, presents challenges of coordination, accountability, and equitable resource distribution. Organizations must perpetually compete for funding, which can prioritize measurable outcomes over long-term, relational work and may neglect issues lacking philanthropic appeal. Thus, the GNN analysis provides a structural explanation for observed differences in practice spontaneity and resilience, linking the morphology of the service delivery network directly to the operational logics and constraints experienced by practitioners on the ground.

Sentiment analysis and semantic embedding models are expected to detect profound differences in the affective and normative underpinnings of community work discourse. In Chinese text, we anticipate a strong positive sentiment association with constructs of "harmony", "stability". These terms are not merely descriptive but carry a normative weight, framing successful community intervention as that which contributes to social cohesion and orderly functioning within a collective framework. The American data, conversely, is predicted to show heightened emotional and semantic salience around concepts of "justice", "rights", "equity", and "empowerment". These terms invoke a framework of moral claims and individual/group entitlements, framing community work as a struggle to rectify systemic wrongs and transfer power to the disenfranchised.

The ensuing discussion will interpret these findings as surface manifestations of deep-seated cultural scripts rooted in collectivist versus individualist worldviews. The Chinese discursive pattern reveals a cultural logic where the community is often perceived as an organic whole, and social problems are framed as disruptions to collective well-being that require management and remediation to restore balance. The primary unit of analysis and beneficiary is the collective. The American pattern, however, exposes a worldview that privileges the individual and the group's rights within the collective. Social problems are framed as injustices—violations of individual or group rights and freedoms—that necessitate advocacy, confrontation, and structural change to empower affected populations. The deep learning model, by quantifying these affective and semantic biases, moves beyond anecdotal observation to provide robust, empirical evidence of how culturally specific value systems concretely shape the very definition of social problems and the legitimized goals of professional intervention. This demonstrates that community practice is not a culturally neutral technical enterprise but is profoundly shaped

by the normative air it breathes.

4. Summary

This paper aims to construct an innovative research framework to explore how deep learning methodologies can be systematically employed to analyze and compare the practical models, inherent logics, and socio-cultural foundations of community social work in China and the United States. Traditional comparative research is often constrained by the scale and generalizability of qualitative methods, struggling to quantitatively reveal structural differences at the macro level. This study proposes that deep learning, through processing massive, multi-source data (such as policy documents, organizational reports, and social media), can provide unprecedented data-driven insights for this field.

The paper first delineates the core similarities and differences between Chinese and American community work: practice in China is rooted in a state-led administrative governance model, emphasizing public service delivery, Party-building guidance, and social stability, presenting a top-down characteristic; whereas practice in the United States originates from its developed civil society, focusing on community organizing, policy advocacy, and social justice, embodying a bottom-up empowerment model. These differences profoundly reflect fundamental distinctions in state-society relations, resource mobilization methods, and cultural values between the two nations.

To empirically validate these differences, this paper outlines a multi-level analytical plan. Specifically, regarding practice models, Natural Language Processing models (e.g., BERTopic) will be applied to conduct topic modeling on literature from both countries. It is anticipated that this will quantitatively identify clustering around themes like "public service" and "dispute mediation" in Chinese data, and a focus on themes like "policy advocacy" and "racial equality" in U.S. data. In terms of resource mobilization, Graph Neural Networks will be used to map and analyze collaboration networks of community service organizations. This is expected to reveal topological differences between China's "hub-and-spoke" government-core network and the "polycentric, distributed" network of non-profit alliances in the U.S. Concerning cultural values, sentiment analysis and semantic embedding techniques will probe the deep-seated cultural scripts within the texts, anticipated to capture a strong affective association with "harmony" and "stability" in Chinese discourse, and a marked emphasis on "rights" and "justice" in American discourse.

Building upon this framework, the paper identifies several promising directions for future research: Firstly, conducting cross-temporal dynamic comparisons using time-series models to track the evolution of community work themes and network structures in both countries, analyzing the long-term impacts of policy changes and social movements. Secondly, advancing multi-modal data fusion, integrating computer vision analysis of data like street-view imagery to investigate the relationship between the physical community environment and social work practice content. Finally, enhancing the causal inference capabilities of models, exploring

the use of cutting-edge causal deep learning models to move beyond correlation analysis and evaluate the real-world causal effects of specific community interventions.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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