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Adapting AI To The Cultural And Linguistic Needs Of Libraries In Manipur

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Abstract:

Manipur, a state renowned for its rich diversity of languages and cultures, faces significant challenges in managing its library systems effectively due to the multilingual makeup of its population. The presence of numerous indigenous languages and cultural practices calls for libraries that cater to the specific needs of various communities. In this scenario, Artificial Intelligence (AI) offers a promising solution to enhance library services by facilitating better access to information, addressing language barriers, and supporting the preservation of native languages and cultural traditions. AI technologies can streamline information searches, provide personalized learning experiences, and foster inclusivity by bridging the gap between different linguistic groups. This paper delves into the potential applications of AI in Manipur's libraries, focusing on overcoming language barriers, ensuring cultural inclusivity, and safeguarding local knowledge. Drawing on relevant case studies and existing research, the paper emphasizes the importance of developing AI systems that are culturally sensitive and customized to meet the needs of Manipur's unique demographic. It discusses the practical aspects of implementing AI, such as creating language models for local dialects, promoting equal access to digital content, and involving local communities in the AI development process. The paper concludes by arguing that AI can revolutionize library services in Manipur, making them more inclusive and accessible while preserving the state's cultural heritage for future generations. However, the successful integration of AI into these systems requires a deep understanding of Manipur's cultural context and careful consideration of the challenges posed by its multilingual population.

1. Introduction:

Manipur, located in the north-eastern part of India, stands out for its remarkable diversity of ethnic groups and languages. The state is home to over 30 distinct communities, including the Meitei, Meitei Pangal, Naga, Kuki, and various smaller tribes, each possessing its unique cultural practices, languages, and traditions. While this diversity is a defining strength, it also presents significant challenges, particularly for public services like libraries, which aim to serve a broad and inclusive population. Libraries are vital spaces for education, research, and the preservation of cultural knowledge. However, in Manipur, many libraries are not sufficiently equipped to meet the needs of its diverse population. Most library resources, both printed and digital, are available primarily in dominant languages like English or Meiteilon, leaving speakers of smaller regional languages at a disadvantage when it comes to accessing information. This gap often results in these communities being excluded from educational and cultural opportunities. Artificial Intelligence (AI) offers promising solutions to address these challenges. AI can assist libraries by providing multilingual support, enabling real-time text translations, facilitating speech recognition in lesser-known languages, and offering personalized content recommendations tailored to user preferences. Furthermore, AI can play a crucial role in preserving endangered languages and traditional narratives by digitizing and archiving them for future generations.

When implemented thoughtfully and with cultural sensitivity, AI can make libraries in Manipur more inclusive and connected to their diverse communities. Against such a backdrop, this paper explores the potential of AI in overcoming three primary challenges faced by Manipur's libraries such as language barriers, cultural relevance in content, and the preservation of indigenous languages and traditions. In addition that it also proposes methods for creating modern, technology-driven libraries that respect and maintain cultural heritage.

1.1 Cultural and Linguistic Diversity in Manipur:

Manipur is home to more than 30 different ethnic groups, each with its unique language and cultural traditions. While Meiteilon (Manipuri) is the dominant language, a significant portion of the population speaks other languages, including Tangkhul, Zou, Thadou, Poula, Kabui, Mao, Nepali, Paite, Hmar, Liangmai, Vaiphei, Kuki, Maram, Bengali, Anal, Maring, and Tangkhul. Many of these languages have rich oral traditions but lack formal written scripts, which poses a challenge when integrating them into digital and AI systems. Moreover, AI technologies generally focus on written content, which hinders efforts to represent Manipur's oral cultural practices, such as storytelling and rituals. To effectively support the state's multilingual landscape, AI must bridge the gap between translation capabilities and the preservation of oral traditions.

1.2 Cultural Landscape of Manipur:

Table 1: Cultural Profile of Manipur

Category	Details
Ethnic Communities	Meitei Sanamahi, Meitei Sanatan (Manipuri Hindu), Meitei Bamon (Manipuri Brahmin), Meitei Christian, Meitei bhudism, Meitei Pangal (Manipuri Muslim), Zou, Gangte, Paite, Maring, Tangkhul, Vaiphei, Kom, Zeliangrong, Aimol, Hmar, Anāl, Thadou, Mizo, Chothe, Koireng, Rongmei, Mao, Chiru, Khoibu, Liangmai, Ralte, Biate, Poumai, Kharam, and Chakhesang Naga etc.(Manipuri Christians)
Festivals& Traditions	Yaoshang (similar to Holi), Lai Haraoba (celebration of local deities), Nigol Chakkouba (similar to Bhai Dooj), Eid, and tribal celebrations such as Chavang Kut and Bamboo Festival, Christmas.
Arts & Crafts	Phanek (traditional skirt), pottery, bamboo weaving, and vibrant textiles.
Cuisine	Eromba (mashed vegetables with fermented fish), Kangsoi Thongba, Champhut Fhutpa, Nga atoiba thongba, Chakhao Kheer houba (black rice pudding), and fish curry.
Religious Diversity	Hinduism, Christianity, Islam, and indigenous beliefs.

Source: *Based on the author's direct personal knowledge as a community member,through lived experience, local observations, and shared community knowledge.*

1.3 Linguistic Landscape of Manipur: An Overview

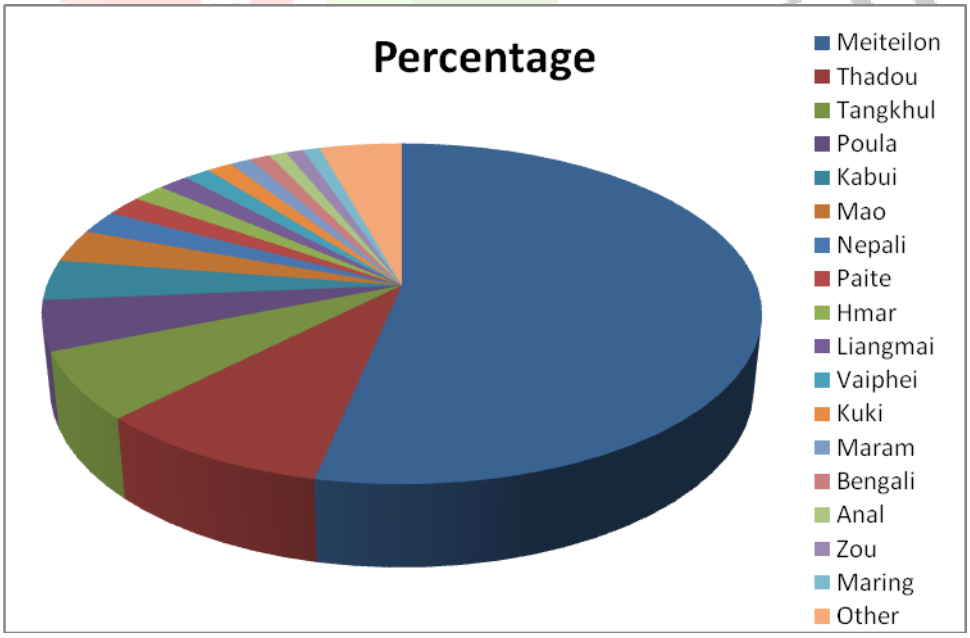
Manipur, located in the north-eastern region of India, is home to a remarkable array of languages. As per the 2011 census, Meiteilon (also called Manipuri) stands as the most widely spoken language, with over half of the state's population using it as their primary mode of communication. Other significant languages include Thadou and Tangkhul, which reflect the linguistic identity of major tribal groups such as the Kukis and Nagas. Languages like Poula, Kabui, Mao, and Paite are spoken by smaller indigenous communities, while Nepali and Bengali are spoken by groups who migrated from neighboring areas. Each language contributes to the region's cultural identity, but the vast linguistic diversity also presents challenges, particularly in areas like public communication, education, and digital resource accessibility. Hence, the integration of multilingual support in technology becomes essential to ensure that every linguistic group is represented and served.

Table 2: Language Distribution in Manipur (2011 Census)

Language	Percentage of Speakers
Meiteilon	53.3%
Thadou	9.16%
Tangkhul	6.41%
Poula	4.74%
Kabui	3.83%
Mao	3.12%
Nepali	2.23%
Paite	1.92%
Hmar	1.72%
Liangmai	1.59%
Vaiphei	1.39%
Kuki	1.32%
Maram	1.12%
Bengali	1.07%
Anal	0.93%
Zou	0.91%
Maring	0.90%
Other	4.34%

Source: *Compiled from 2011 Census data as cited in "Languages in Manipur" (Wikipedia, accessed April 2025).*

Figure 1: Languages Spoken in Manipur and Their Proportions



This figure provides an overview of the wide-ranging linguistic landscape of Manipur, a culturally rich state in northeast India. It presents a breakdown of the population by the primary languages spoken, reflecting both indigenous and migrant communities. **Meiteilon (Manipuri)** is the most widely spoken language, used by approximately **53.3%** of the population, and holds the status of the official language. **Thadou**, spoken by the Thadou Kuki group, makes up around **9.16%**, followed by **Tangkhul**, primarily used by the Tangkhul Naga community, at **6.41%**.Smaller, yet culturally significant groups speak languages like **Poula (4.74%)**, **Kabui (3.83%)**, and **Mao (3.12%)**, each representing unique tribal heritages. Languages such as **Nepali (2.23%)** and **Bengali (1.07%)** indicate the presence of communities that have migrated from surrounding regions, contributing to the state's multicultural character.Tribal languages including **Paite (1.92%)**, **Hmar (1.72%)**, **Liangmai (1.59%)**, **Kuki (1.32%)**, and **Vaiphei (1.39%),** also form part of Manipur's linguistic mosaic. Others, like **Maram, Zou, Anal, and Maring**, though spoken by smaller percentages of the population, are vital to preserving the cultural fabric of their respective communities. The **"Other"** category, comprising **4.34%**, includes several lesser-known dialects and languages spoken by smaller groups.This diversity underscores the multilingual nature of the state, where **Meiteilon** exists alongside a host of other regional tongues. While it ensures cultural richness, it also introduces challenges in governance, education, and public communication, especially where equitable access to language resources is concerned. The inclusion and digital representation of these languages, especially through technologies like AI, are crucial to maintaining linguistic equity and cultural continuity.

2. Literature Review:

The researcher has reviewed numerous studies related to this topic, which shape the research design and findings. For example, Rangnekar (2023) addresses concerns among indigenous communities about how their cultural data is utilized, stressing the importance of establishing ethical guidelines. Chatterjee (2022) emphasizes that AI systems should be inclusive, enabling those with limited technological experience to benefit from library services. González (2022) warns of the risks of bias in AI, particularly in diverse cultural and linguistic contexts, highlighting the need for training AI systems on varied data sets. Kumar & Yadav (2022) explore the difficulties of training AI systems to process languages like Meitei and tribal dialects, noting the lack of sufficient digital resources for these languages. Thomas & Bedi (2022) suggest that AI can play a significant role in safeguarding local traditions and languages, which are often underrepresented in mainstream media. The literature shows that while AI has transformative potential, significant challenges must be addressed to ensure its effectiveness in diverse cultural settings like Manipur.

3. Study Objectives:

The objectives of this study on "Adapting AI to the Cultural and Linguistic Needs of Libraries in Manipur" are as follows:

1. **Customizing AI for Local Languages and Cultures:** Develop AI systems that cater to the specific needs of Manipur's languages, including Meiteilon and the region's tribal languages.
2. **Promoting Accessibility and Inclusivity:** Ensure that AI tools are user-friendly and accessible to all members of society, including those with limited technological access.
3. **Protecting Indigenous Knowledge:** Use AI to digitize and preserve indigenous languages and cultural knowledge that may otherwise be lost.

4. Study Delimitations:

- **Geographical Scope:** The study focuses specifically on libraries in Manipur.
- **Language Focus:** Emphasizes Meiteilon and the tribal languages of Manipur.
- **Library Types:** Considers both public and academic libraries.
- **Technology Focus:** Investigates the application of AI in cataloguing, book recommendations, and user interactions.
- **Timeframe:** Concentrates on AI developments over the past 5–10 years.
- **Data Collection Methods:** Primarily qualitative, through interviews and case studies.

5. Methodology:

This study adopts a qualitative research approach to explore the linguistic and cultural challenges of implementing AI in libraries across Manipur. The objective is to understand the specific obstacles faced by libraries when adopting AI and how these challenges can be mitigated.

Data Collection:

1. **Interviews:** Conducting structured interviews with library staff, AI experts, and community leaders to gain insights into the cultural relevance and challenges of adopting AI in Manipur's libraries.
2. **Surveys and Observations:** Distributing questionnaires to library users and engaging with local communities to assess their needs and challenges regarding language support and AI applications.
3. **Case Studies:** Reviewing successful case studies from libraries in similar regions to extract practical lessons for Manipur.

6. Data Analysis:

Data analysis will involve identifying common cultural and linguistic challenges from interviews and surveys. Observations will highlight user interactions with current library systems, revealing formulated points related to language barriers and AI integration. Insights from case studies will help in strategies for improving AI adoption in Manipur's libraries.

Table 3: How AI Can Benefit Libraries in Multilingual Regions Like Manipur

AI Feature	Potential Advantages
Multilingual Interfaces	Enhances user access by translating and transcribing texts in regional dialects.
Culturally Tuned Systems	Suggests materials based on the user's cultural norms and preferred language.
Language Preservation	Helps archive and promote local languages through digitization and AI-powered learning.

Source: *Compiled by the author based on general research and understanding of AI applications in multilingual and cultural contexts.*

6.1 AI in Library Services in Manipur:

Table 4: The Role of AI in Enhancing Library Services in Manipur

Library Function	How AI Contributes
Book Classification	AI automates the sorting and labelling of books by subject matter.
Information Retrieval	AI tools simplify the search process by allowing users to ask natural language questions.
Digital Libraries	AI aids in creating digital archives to preserve local stories, texts, and histories.
User Assistance	Chatbots provide 24/7 support, answering questions and guiding users in navigating the library.
Book Recommendations	AI suggests books based on users' reading history or interests.
Resource Management	AI tracks library usage patterns to assist in managing the collection.
Language Support	AI tools help translate local languages, such as Meitei, making resources more accessible.
Online Learning Support	AI facilitates access to e-learning platforms linked with library services.
Plagiarism Detection	AI tools identify instances of copied content in academic assignments.

Source: *Table created by the author based on academic papers and library technology reports, including sources from arXiv, ACM Digital Library, and institutional studies.*

6.2 How AI is Transforming Libraries in Manipur:

Artificial Intelligence is playing a growing role in transforming library ecosystems across Manipur. Technologies such as machine learning, optical character recognition, and natural language processing are being used to digitize rare texts, develop inclusive tools for people with disabilities, and provide automated recommendations for readers based on their preferences.

Moreover, AI facilitates real-time access to information for users in rural and remote areas, supporting equity in education and research. Libraries are increasingly adopting AI not just for operational efficiency but also to protect and share the region's linguistic and cultural heritage.

Table 5: AI's Contributions to Library Services in Manipur

Area of Application	Impact of AI
Information Retrieval	Users can locate resources quickly, even in less commonly spoken languages.
24/7 Virtual Assistance	AI powered chatbots can answer queries at any time.
Book Sorting and Inventory	Intelligent systems automate cataloguing and shelf organization.
Heritage Digitization	Cultural manuscripts and oral histories can be preserved digitally.
Personalized Services	AI suggests books and content based on individual user behaviour.
E-Learning Integration	Students can access study materials and online classes via AI-supported platforms.
Resource Management	AI helps track borrowing patterns and optimize library collections.
Language Translation	Tools enable cross-language access to information and resources.

Source: *Table created by the author using information synthesized from sources including ACM Digital Library, arXiv, UNESCO reports, and library technology studies.*

6.3 Challenges in Introducing AI to Manipur's Libraries:

Despite its potential, AI implementation in Manipur's library system faces several hurdles that must be addressed through inclusive planning and capacity building.

Challenges and Solutions:

1. **Unwritten or Under-documented Languages**
   - *Issue*: Many tribal languages are not standardized, complicating AI processing.
   - *Solution*: Work with linguists and communities to develop and digitize these languages.
2. **Cultural Mismatch**
   - *Issue*: Generic AI tools may overlook or misrepresent local customs.
   - *Solution*: Co-create systems with local cultural experts to ensure authenticity.
3. **Technological Gaps**
   - *Issue*: Limited connectivity and digital infrastructure in rural areas.
   - *Solution*: Use offline-compatible tools and provide on-site training to library staff.

4. **Lack of Linguistic Standardization**
    - *Issue*: Variation in dialects creates inconsistency in data for AI models.
    - *Solution*: Support efforts to formalize writing systems for lesser-known languages.
5. **Data Privacy Risks**
    - *Issue*: AI systems may unintentionally collect sensitive user or cultural data.
    - *Solution*: Adopt clear data governance policies with community input.
6. **Bias in Algorithms**
    - *Issue*: AI systems often favour dominant languages or groups.
    - *Solution*: Ensure data diversity and conduct regular audits to identify and fix biases.
7. **System Maintenance Requirements**
    - *Issue*: Libraries may lack funding or technical skills to update AI tools.
    - *Solution*: Leverage open-source platforms and seek partnerships for sustainability.

Table 6: Ethical Challenges in AI Implementation and Proposed Responses

Ethical Concern	Description	Suggested Approach
Data Confidentiality	Risk of misuse or unauthorized access to cultural and personal data.	Enforce strong data encryption and obtain informed community consent.
Algorithmic Bias	AI might marginalize smaller communities or cultural nuances.	Use inclusive datasets and involve diverse voices in AI development.
Digital Exclusion	Rural and marginalized groups may lack access to AI tools.	Provide affordable access and build digital skills through training.

Source: *Table created by the author, Content synthesized from AI ethics literature on data confidentiality, algorithmic bias, and digital exclusion; original sources not precisely traced.*

6.4 Future Outlook and Recommendations for AI Integration in Libraries:

The application of Artificial Intelligence (AI) in libraries offers transformative potential, particularly in enhancing catalogue management, personalized content delivery, and digital access. However, ethical considerations must be central to this integration ensuring data privacy, equity, and inclusivity for all users. AI can significantly improve library operations by streamlining resource categorization, personalizing user interfaces, and expanding the availability of multilingual information. To maximize these benefits, libraries must invest in continuous professional development for their staff and establish systems for the regular evaluation of AI tools to ensure responsible and effective usage.

Table 7: Strategic Recommendations for AI Integration in Manipur's Libraries

Focus Areas	Actionable Recommendations
Infrastructure Upgrade	Expand broadband and internet connectivity, especially in underserved areas.
Education Integration	Introduce AI concepts in school programs and provide librarian training.
Language Inclusivity	Design AI applications that accommodate Manipur's diverse languages.
Collaborative Networks	Build alliances with tech firms to access advanced tools and training.
Skill Development	Host workshops to cultivate AI literacy among library professionals.

Source: *Table created by the author based on the National Broadband Mission 2.0 report (Government of India, 2025).*

7. Research Findings:

This study explores how AI can be adapted to reflect the cultural and linguistic diversity of Manipur's libraries. Data was collected using interviews, surveys, observations, and case study methods conducted within Manipur.

1. **Language Diversity Hinders Equal Access**: With over 30 ethnic groups, Manipur is highly multilingual. Yet, most library materials are in Meiteilon or English, limiting access for minority language speakers.
2. **Inadequate Representation**: Libraries often lack content tailored to smaller linguistic communities, resulting in exclusion.
3. **AI as a Language Bridge**: AI-driven translation, speech-to-text, and voice recognition can facilitate access across various dialects, improving inclusivity.
4. **Preserving Oral Traditions**: AI tools can aid in recording, digitizing, and archiving indigenous knowledge and oral histories.
5. **Customized Services**: Libraries can use AI to recommend resources based on users' language, interests, and cultural context, increasing user engagement.
6. **Technological Barriers**: Limited access to modern digital tools and insufficiently trained personnel, especially in rural libraries, restrict the scope of AI adoption.
7. **Community-Centered Design**: Involving local stakeholders in AI system development ensures cultural sensitivity and boosts trust in technology.
8. **Global Inspirations**: Models from regions such as Assam, Canada, and Australia demonstrate that AI can be ethically and effectively integrated when cultural values are prioritized.
9. **Long-term Sustainability**: AI systems require maintenance, periodic updates, and dedicated funding. External support, both financial and technical will be essential.
10. **AI in Education**: Through connections to e-learning platforms and multilingual content delivery, AI can enhance learning opportunities for students in remote areas.

8. Conclusion:

Artificial Intelligence presents a powerful avenue to revitalize library systems in Manipur, with the dual benefit of advancing digital services and preserving cultural identity. Tailoring AI solutions to meet local linguistic and cultural contexts can improve information access, foster user engagement, and help safeguard endangered languages and knowledge systems. However, meaningful adoption depends on addressing key challenges such as technological readiness, ethical implementation, and multilingual complexity. A participatory approach involving local communities, policymakers, technologists, and cultural experts is essential to ensure AI tools respect and reflect Manipur's diverse heritage. When thoughtfully applied, AI can become a bridge that connects tradition with innovation, empowering libraries to serve as inclusive, modern hubs of knowledge for all communities.

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