


Chapter 2

AI–Driven Indigenous Knowledge Management

Ensuring Ethical Accessibility

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ABSTRACT

Indigenous Knowledge (IK) systems are organized around cultural sovereignty, confidentiality, and moral leadership, while FAIR principles are intended to promote open information sharing. The relationship between sovereignty and accessibility is analyzed and modeled using a Bi-Stacked Artificial Neural Network technique. Using Particle Swarm Optimization, feature selection streamlined, preprocessed, and standardized data gathered from Indigenous governance models and FAIR compliance reports. In order to create knowledge-sharing models that adhere to Indigenous standards and are practical, Bi-Stacked ANN is trained in hierarchical representations and ethical AI frameworks improve the interpretability of models. Responsible data handling is promoted thus to ensure global access to information and Indigenous people's rights in balance. The results show AI-driven policy simulations that both promote digital inclusion and cultural sovereignty.

DOI: 10.4018/979-8-3373-0204-1.ch002

INTRODUCTION

The FAIR (Findable, Accessible, Interoperable, and Reusable) principles guarantee that there is effective management and sharing of data. They make digital assets, like research data and knowledge, that are made discoverable and part of world information systems. The principles are hard to apply to Indigenous Knowledge (IK), however. Indigenous knowledge has sensitive cultural, spiritual, and customary information that the communities may wish to protect. FAIR standards open access are the norm, but sovereignty of knowledge means more to Indigenous people. Where it gets confusing is when access collides with the right to own culture. Indigenous voices contend that knowledge shall be shared based on their option and maintain their sacred traditions. And the digital divide can make sure that Indigenous peoples do not even have ownership over their data. These considerations must be included in adjusting FAIR principles that heed Indigenous sovereignty.

Indigenous Knowledge permeates oral cultures, rituals, and everyday life, and thus its digitalisation is complex. Classification and metadata models of FAIR-based repositories can be in conflict with Indigenous epistemologies. Western systems box off pieces of knowledge, but Indigenous cultures think of knowledge as a single entity that is contained in land, community, and spirituality. Metadata structures can disguise or desocialise Indigenous Knowledge, and this creates ethical concerns. Some Indigenous groups worry that unfettered digitization will create an opportunity for exploitation or abuse. Also, open access to sacred knowledge would be against cultural protocols. The challenge is making knowledge accessible and reusable without undermining Indigenous jurisdiction. That requires a paradigm shift in how digital repositories operate, with Indigenous consent-based models being incorporated.

Accessibility, one of the foundations of FAIR, must be balanced against Indigenous rights to decide who gets to access their knowledge. Open-access repositories are generally at odds with Indigenous data sovereignty values, which are concerned with community control and ownership. Other avenues include through Indigenous data governance models such as the CARE (Collective Benefit, Authority to Control, Responsibility, and Ethics) principles. These models give more importance to the point that Indigenous communities are entitled to decide access rights based on their values and traditions. Instead of open access, Indigenous repositories can have conditional or tiered access. For example, some knowledge may be publicly accessible, while sacred or sensitive knowledge is restricted. Combining FAIR and CARE principles could create a more ethical data management approach.

Yet another FAIR principle, interoperability, ensures data is interoperation-capable between systems and platforms. Indigenous Knowledge, by nature, would often be imparted in mixed media, i.e., stories in words, dance, music, and images. Standard digital media, e.g., text databases, may not be able to capture this variety. On top

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