

# LLMs Empowering Communities

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## Abstract

Large-language models (LLMs) represent the current frontier of artificial intelligence, combining transformer architectures with billions-to-trillions of parameters to learn general statistical representations of human language. While commercial systems such as GPT-4 have attracted most public attention, a rapidly maturing ecosystem of *open-source* LLMs—e.g., Meta-AI’s Llama 3, Mistral 7B, Phi-3-Instruct—now allows researchers, governments, and small organizations to train, adapt, and deploy state-of-the-art models on their own hardware with full reproducibility and no vendor lock-in. Utilizing these open-source models also minimizes many costs that come with using the services of commercial companies. This paper explores the architecture, refining methodologies, and potential applications of open-source large language models (LLMs). It spotlights two compelling applications: PPEDPATC, a bilingual web tool for the Pijao Indigenous Community in Colombia, couples a local Llama-3 checkpoint with a slim retrieval index to auto-draft culturally tuned market analyses, financial forecasts, and grant-ready business plans— helping entrepreneurs in underserved regions overcome language barriers and cutting proposal timelines from a year to one semester; and a traffic-prediction pipeline that streams social-media chatter through a fine-tuned Llama-3 and a graph-LSTM to deliver low-cost, real-time congestion forecasts for rapidly megacities in underdeveloped countries, matching sensor-heavy systems at a fraction of the expense. Together, these solutions illustrate the transformative potential of open-source LLMs to spur technological innovation and social progress, validating their practicality and power as transparent, cost-effective alternatives to proprietary models.

## Keywords

Large Language Models, Open-Source, Traffic Forecasting, Vulnerable Populations.

## Biographies

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