This document provides a brief technical overview of a fully offline AI architecture, presented for reference and consideration.

Technical Overview

An Ultra-Lightweight, Offline AI Architecture for Humanitarian Environments

Author: Gyu-min Jeon

Affiliation: M- Corp AI Initiative / Hanbat National University

Keywords: Offline AI, Humanitarian Technology, Explainable AI (XAI), k-NN, RLS, Thompson Sampling, GDPR, UNCRC, CRPD

Overview

This document presents a technical approach to artificial intelligence design in the form of a fully self-contained, 54-kilobyte HTML file that embeds three traditional AI techniques—k-Nearest Neighbors (k-NN), Recursive Least Squares (RLS), and Thompson Sampling—entirely offline. The system operates without internet connectivity, servers, or cloud infrastructure, enabling deployment in resource-constrained environments such as refugee settlements, disaster zones, and regions with limited electricity access.

Unlike cloud-based models that depend on extensive datasets and centralized computation, this architecture operates locally within a browser environment using only device memory. The system collects no personal data and aligns structurally with GDPR, UNCRC, and CRPD standards, supporting ethical deployment in sensitive humanitarian contexts. Every vector, weight update, and decision path is explicitly exposed, offering transparency and contributing to the field of Explainable AI (XAI).

This model introduces a research direction for AI that prioritizes minimal resource requirements, full auditability, privacy preservation, and community maintainability. It opens inquiry into embedded AI, decentralized governance models, and technology infrastructure that respects local sovereignty. This architecture is presented not merely as a technical exercise, but as a potential tool for real-world humanitarian protection—demonstrating that AI systems can be compact, ethically grounded, and field-appropriate.

Why This Represents a Different Technical Approach

1. AI as a Single Document

Traditional AI systems depend on extensive cloud infrastructure and large datasets. This design compresses AI functionality into a single 54-kilobyte HTML file. The file itself serves as the engine, rather than merely providing an interface to remote services.

2. Operation Without Servers or Internet

Most AI systems require network connectivity to function. This design operates entirely within a browser environment, with no network calls whatsoever. It functions during connectivity disruptions, infrastructure failures, or deliberate network restrictions—contexts where mainstream AI approaches cannot operate.

3. Privacy by Design, Not as Addition

Unlike data-intensive AI models, this system collects no personal information. It structurally aligns with GDPR, UNCRC, and CRPD, demonstrating that AI without surveillance infrastructure is technically feasible.

4. Field-Ready and Community-Maintained

Refugee settlements, disaster zones, and low-infrastructure regions cannot depend on data centers. By enabling existing mobile devices to serve as self-sustaining nodes, local communities may operate and maintain the system independently.

5. Minimal Size with Full Transparency

While modern AI systems often operate as opaque processes, this system exposes every vector, similarity measure, and weight update in code. It is simultaneously ultra-lightweight and fully explainable—a combination rarely seen in AI research contexts.

In summary, this project represents an approach that differs from conventional AI development: lightweight, offline-capable, privacy-preserving, transparent, and suited for field deployment. These characteristics may warrant consideration as a distinct technical direction.

Project Background

Founder: Gyu-min Jeon

This initiative operates on a non-commercial basis and employs an ultra-lightweight, privacy-preserving, fully offline architecture as an ethical form of artificial intelligence. Its purpose is not to collect data, but rather to embody technology grounded in human judgment, responsibility, and ethical principles.

Technical Architecture

A Single Image File in Size — Containing Three AI Engines

The 54-kilobyte Offline AI is comparable in size to a single image file. Within this compact HTML document reside three distinct AI techniques, each operating entirely offline and requiring no servers or internet connectivity.

The Three Embedded AI Techniques:

k-NN AI: Pattern Recognition from Past Data

When a new signal is received, the system searches past data to identify similar previous cases. This is the k-Nearest Neighbors algorithm (k-NN) at work.

RLS AI: Real-Time Adaptation to Human Feedback

When field personnel confirm or dismiss an alert, the system immediately adjusts its internal weights based on that feedback. This is Recursive Least Squares (RLS)—a form of real-time, online learning.

Thompson Sampling AI: Probability-Driven Decisions Under Uncertainty

The system models each context or situation as a Beta-Bernoulli process. As observations accumulate, the posterior distribution updates. At each decision point, the system samples from this distribution to determine whether to explore further or issue a warning based on assessed risk level. This is the Thompson Sampling algorithm.

All of this exists within a single 54-kilobyte HTML file. No server infrastructure. No internet connectivity requirement. No cloud dependencies.

In environments experiencing infrastructure failure, connectivity restrictions, or deliberate censorship, this system operates, adapts, and provides assistance—entirely on its own. This represents a technical approach that prioritizes minimal resources, ethical operation, transparency, and field readiness.

This document is provided for technical reference and consideration. Further technical documentation and working prototypes are available upon request.