

Sahi-Ration

From Minutes to Seconds: Evaluating AI-Driven SMS Agents for Rapid Ration Verification in Rural India

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Abstract

The Public Distribution System (PDS) is a critical food security lifeline in India, yet it faces transparency challenges due to the “Digital Divide.” While government data is available online, it is inaccessible to millions of rural citizens due to complex interfaces and literacy barriers. This research introduces **Sahi-Ration**, an Agentic AI solution that allows users to verify their ration entitlements via a simple SMS/MMS image upload. By utilizing an SMS-integrated Agent, users can send a photo of their ration card, which is processed using Python-based Optical Character Recognition (OCR). The system uses an AI Agent to compare entitlements and automatically responds with an automated voice call or audio link in the user’s local language. This study aims to evaluate the time-efficiency of this SMS-based approach compared to manual web-searching, specifically focusing on accessibility for citizens without high-end smartphones.

1. Introduction

India’s PDS manages food grains for over 800 million people. Despite digitization, “last-mile leakage” remains common because citizens often do not know what they are legally owed. Accessing official portals requires digital skills and smartphones that many rural workers lack.

The significance of this study is its “Universal Accessibility” design. By utilizing an SMS Agent—a tool available on even the most basic mobile phones—and converting data into an automated spoken response, the project bridges the literacy gap. This research focuses on the technical feasibility of using an SMS/MMS-based AI Agent as a digital auditor to empower the common citizen.

2. Literature Review

Existing research shows that while Biometric (PoS) machines have reduced ghost beneficiaries, they do not empower the consumer with information. Most current mobile applications are text-heavy and require manual data entry, which is difficult for non-educated users.

Current gaps in knowledge include:

- **The Literacy Gap:** Lack of tools that provide information through automated voice rather than text.
- **The Hardware Gap:** Most solutions require high-end smartphones and high-speed internet. There is a lack of research on using SMS/MMS gateways to provide AI-driven PDS transparency.

3. Objectives

The specific goals of this project are:

1. To build an AI system that reads Ration Cards from SMS/MMS images using Python OCR with 90% accuracy.
2. To create an n8n workflow that connects an SMS Gateway to a PDS database.
3. To provide information via automated local language audio (IVR/Voice Call) to solve the literacy problem.

4. To prove that SMS-based AI verification is at least 5x faster than manual web searching.

4. Methodology

The research uses a **System Development and Experimental** approach:

- **Technical Stack:** SMS/MMS Gateway (for communication); Python (FastAPI + EasyOCR) for document reading; n8n for workflow logic; and OpenAI/LLM for data reasoning.
- **System Flow:** User uploads photo via SMS/MMS → Python extracts ID number → n8n fetches database info → AI Agent identifies discrepancies → System triggers an automated voice call to the user in their local language.
- **Testing:** 10 participants will be timed while searching for data on the official portal vs. using the Sahi-Ration SMS Agent to collect comparative data.

5. Hypotheses

- **H1:** AI-automated verification via SMS/MMS will take less than 60 seconds per user.
- **H2:** The manual web-portal verification will be unsuccessful for most non-literate users, whereas the SMS-Voice agent will have a 100% comprehension rate.

6. Expected Outcomes

The project is expected to prove that SMS-based AI Agents can democratize government information. The primary outcome will be a functional prototype that allows a worker to receive their ration details via a simple voice call after sending an SMS. We expect to show that this approach is far more effective for rural populations than traditional text-based websites.

7. References

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