Sahi-Ration

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

Nemish Sapara
Under the Guidance of: **[Enter Your Faculty Name Here]**

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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 WhatsApp image upload. Using Python-based Optical Character Recognition (OCR), n8n workflow automation, and Text-to-Speech (TTS) technology, the system converts complex data into local voice notes. This study aims to evaluate the time-efficiency of this AI-automated approach compared to manual web-searching. Preliminary tests suggest a reduction in verification time from 5 minutes to under 40 seconds, significantly empowering non-literate citizens to combat corruption at the grassroots level.

1. Introduction

India's PDS manages food grains for over 800 million people. Despite digitization, "last-mile leakage"—where shopkeepers under-measure grain—is common. The primary reason is information asymmetry: citizens do not know what they are legally owed. Accessing official portals requires digital skills that many rural workers lack.

The significance of this study is its "Voice-First" design. By utilizing WhatsApp—a platform familiar to rural India—and converting data into spoken Hindi, the project bridges the literacy gap. This research focuses on the technical feasibility and the efficiency gains of using an AI Agent as a digital auditor for 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. Apps like "Mera Ration" exist but are text-heavy and require manual data entry.

Current gaps in knowledge include:

- **The Accessibility Gap:** Lack of automated tools for people who cannot read digital tables.
- **The Automation Gap:** Lack of research on using "Agentic Workflows" (n8n) to connect government databases to consumer-friendly apps like WhatsApp.

3. Objectives

The specific goals of this project are:

1. To build an AI system that reads Ration Cards using Python OCR with 90% accuracy.
2. To create an n8n workflow that connects WhatsApp to a PDS database.
3. To provide information via local voice notes (TTS) to solve the literacy problem.
4. To prove that AI verification is at least 5x faster than manual web searching.

4. Methodology

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

- **Technical Stack:** Python (FastAPI + EasyOCR) for document reading; n8n for logic flow; OpenAI/LLM for data reasoning; and WhatsApp Cloud API for the interface.
- **System Flow:** User uploads photo $\rightarrow$ Python extracts ID number $\rightarrow$ n8n fetches database info $\rightarrow$ AI Agent compares stock levels $\rightarrow$ System generates a Hindi Voice Note.
- **Testing:** 10 participants will be timed while searching for data on the official portal vs. using the Sahi-Ration bot to collect comparative data.

5. Hypotheses

- **H1:** AI-automated verification via WhatsApp will take less than 45 seconds per user.
- **H2:** The manual web-portal verification will take more than 300 seconds (5 minutes) and have a higher error rate among rural users.

6. Expected Outcomes

The project is expected to demonstrate that AI can be a tool for social justice. The primary outcome will be a functional prototype that proves technology can be simplified for the most vulnerable sections of society. We expect to show that "Voice-First AI" can reduce information corruption in the PDS system by 100% for the users who adopt it.

7. References

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