

Auto-scalable & Low-cost Analytics Solution for Kirana Store

Runcy Oommen: Server & DB Architecture

Kirti Ranjan: Machine learning & Computer Vision

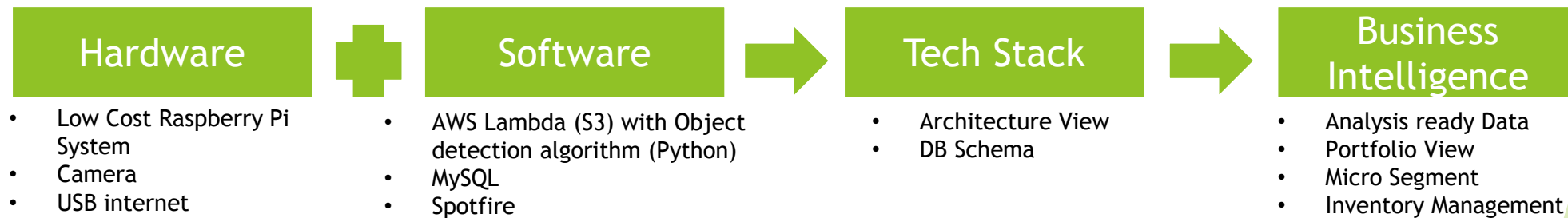
Rai Rajani: Analytics & Inventory Management



Overview

- **Problem:** Given the constraint on cost of investment and connectivity, the problem is to capture sales data from Kirana store: accurately and real-time, to understand consumer behaviour and automate inventory management.
- **Solution:** The proposed solution is to have a Raspberry Pi system (with camera, barcode scanner and USB internet) for capturing the sell out information from the Kirana stores to understand the store operations in effective way. The analytics solution aims to create meaningful micro-segments based on stores activity captured through PoS data and Camera data. The data is then merged to give signals on Spotfire around the stores reordering point based on fill rate of specific product categories.

► Approach



Advantages

- App free approach: No dependency of having a computer or mobile with good storage and processor
- No capability or interaction required from KIRAN Store Person
- Visualization dashboard is easily consumable by sales person/Manager without any HOW TO USE training

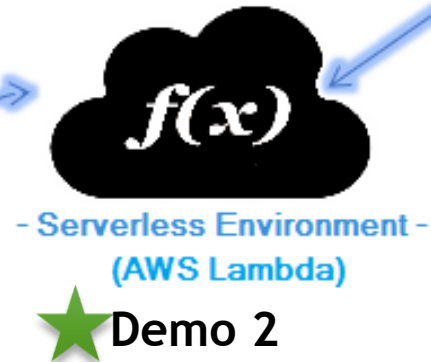
Hack Overview



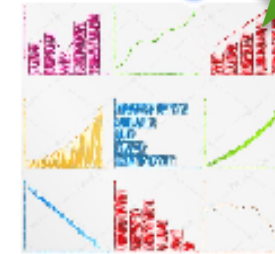
★ Demo 3

- Raspberry-Pi-3 Model B w/ 5 MP Camera Module -
- ELEMENTZ USB Adapter Charger for Raspberry Pi -
- SD Card (64 GB) - 80 min + 8000 pictures -
- Wireless Barcode Scanner -

Total Cost \$115



- Datastore -



- Visualization -
(Spotfire)

★ Demo 1

- ▶ **Demo 1:** Visualization on Spotfire with existing data (Dummy data) from Barcode showing state of business at Area code and/or store level (Inventory condition, Top product category, sales person visits) and explaining how we defined Micro segment for each store
- ▶ **Demo 2:** Demo on Sales person uploading the data to system and the dashboard signals changing.
- ▶ **Demo 3:** Demo on how different camera shots change the inventory status available on the Spotfire Dashboard with live identification of BRAND name of specific item passing through the camera

Demo 1

Rajani is a Sales Manager of North Delhi. She is looking at the dashboard for the first time and she has some idea about the data used

SummaryStore DeepdiveSummary - Demo1Store Deepdive - Demo1Summary - Demo2Store Deepdive - Demo2

Hindustan Unilever Limited

Reset FiltersReset Marking

Summary Overview and Comparison with Previous Time Period

Filters

Time Period

Type to search Q

(All) 3 values

Monthly

Quarterly

Weekly

Area Code

Type to search Q

Total Order Amount

₹ 3.95M

↑ (1.5 %)

#Unique Products

1,163

↑ (17.0 %)

#Orders

158,802

↓ (-2.4 %)

Avg Order Size

₹ 78.22k

↑ (15.5 %)

Filters

Time Period

Type to search Q

(All) 3 values

Monthly

Quarterly

Weekly

Area Code

Type to search Q

Top Performers

Top

Name

Top Product Category

OIL

Top Retailer

1

Top Sales Person

Alex

Inventory Summary

Category

#Unique Products

Low Stock

200

Out of Stock

77

Surplus Stock

221

Total Products

498

Summary of Order Details

Store

Sales Person

Orders Received

Orders Delivered

Salesperson Last Visit

Online Data Feed%

1

Alex

1,897

1,178

9/10/2017

70.0 %

2

Mike

5,073

3,213

8/24/2017

60.0 %

5

Mike

1,298

847

9/11/2017

75.0 %

15

Alex

7,894

7,216

9/17/2017

60.0 %

1184

Alex

7,414

8,087

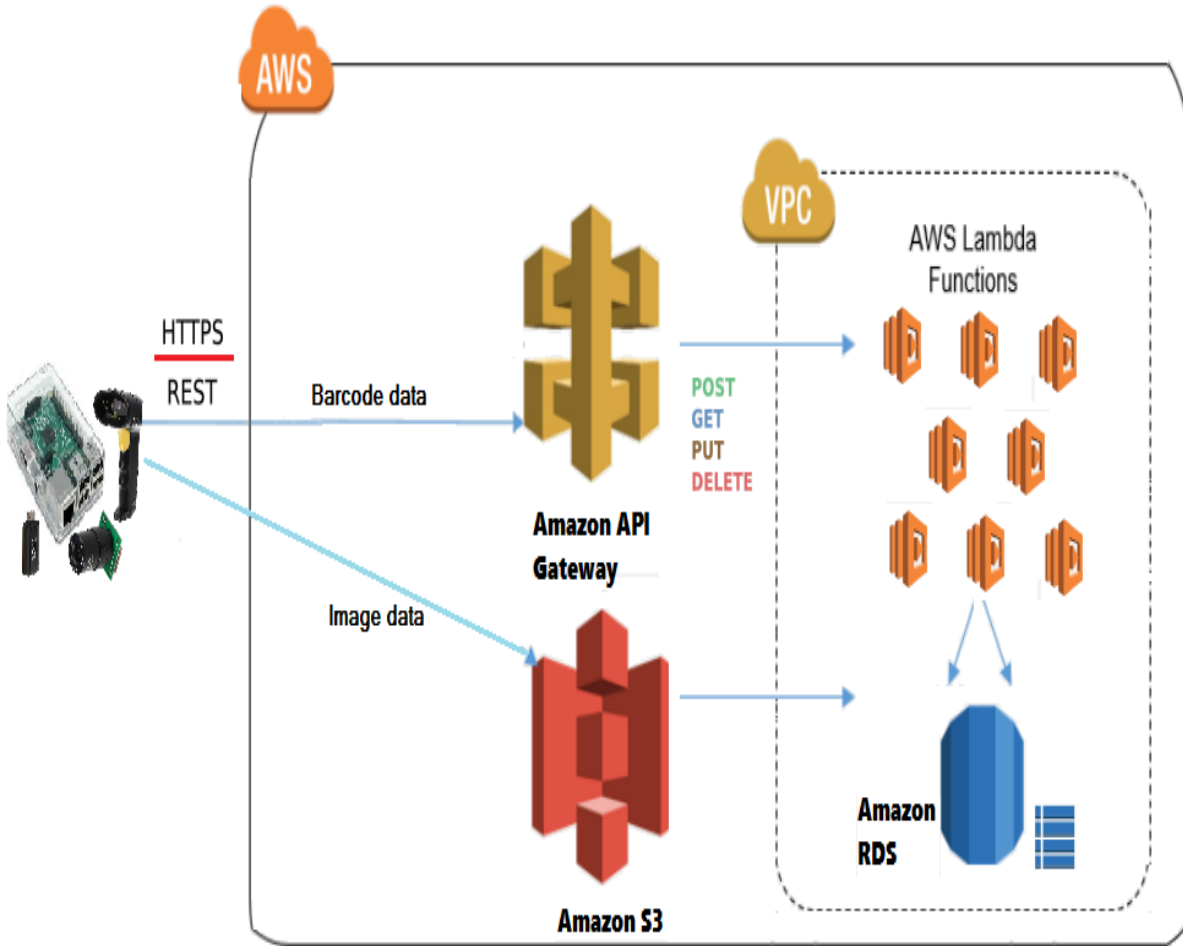
9/16/2017

92.0 %

Ready

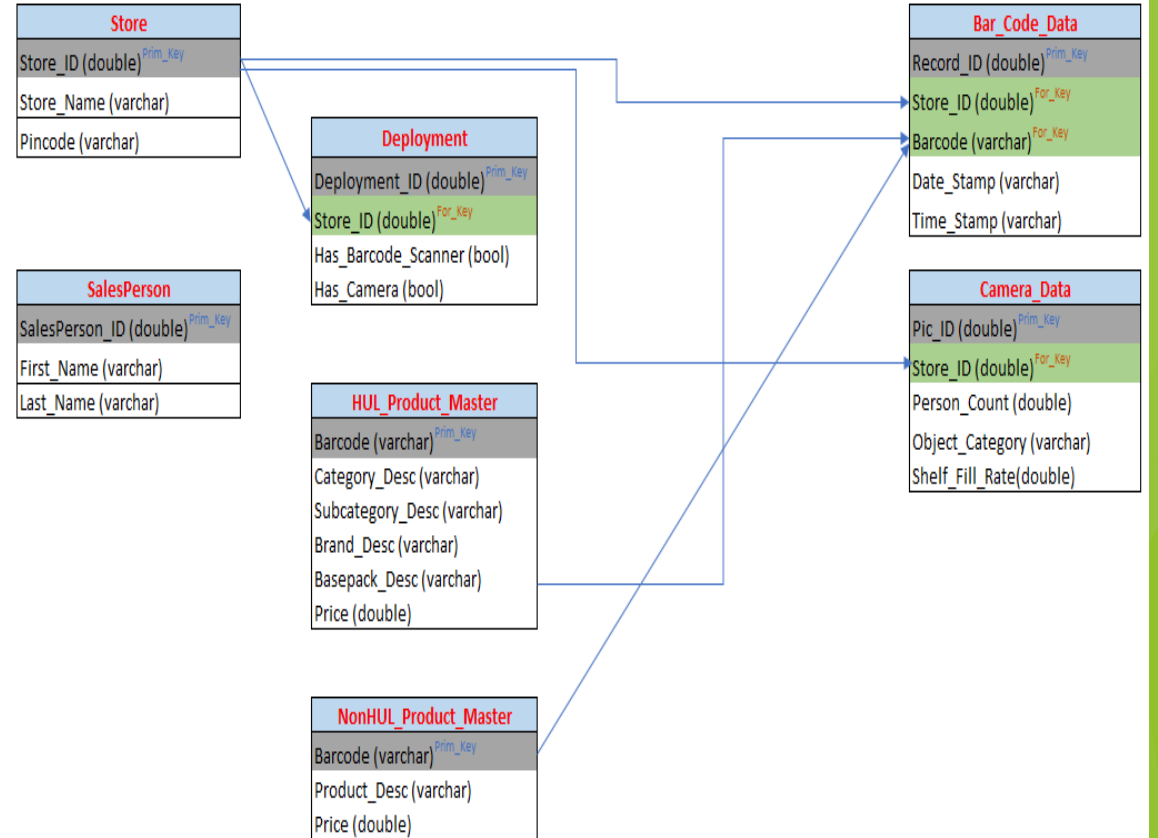
320 of 320 rows0 marked7 columnsSummary - 3rd

Demo 2

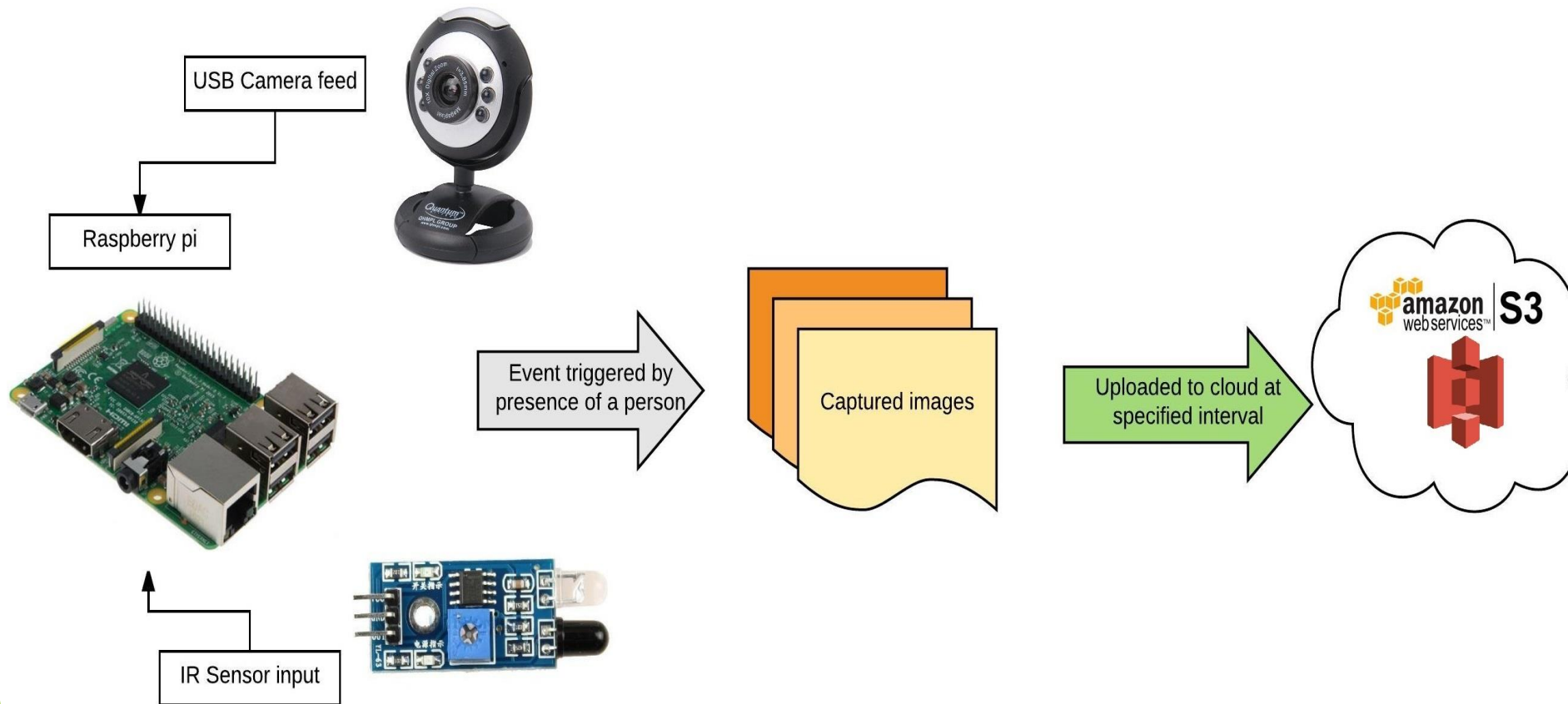


AWS Lambda Functions converts image and bar-code data which will be stored in DB for analytics consumption

DB Schema



Demo 3

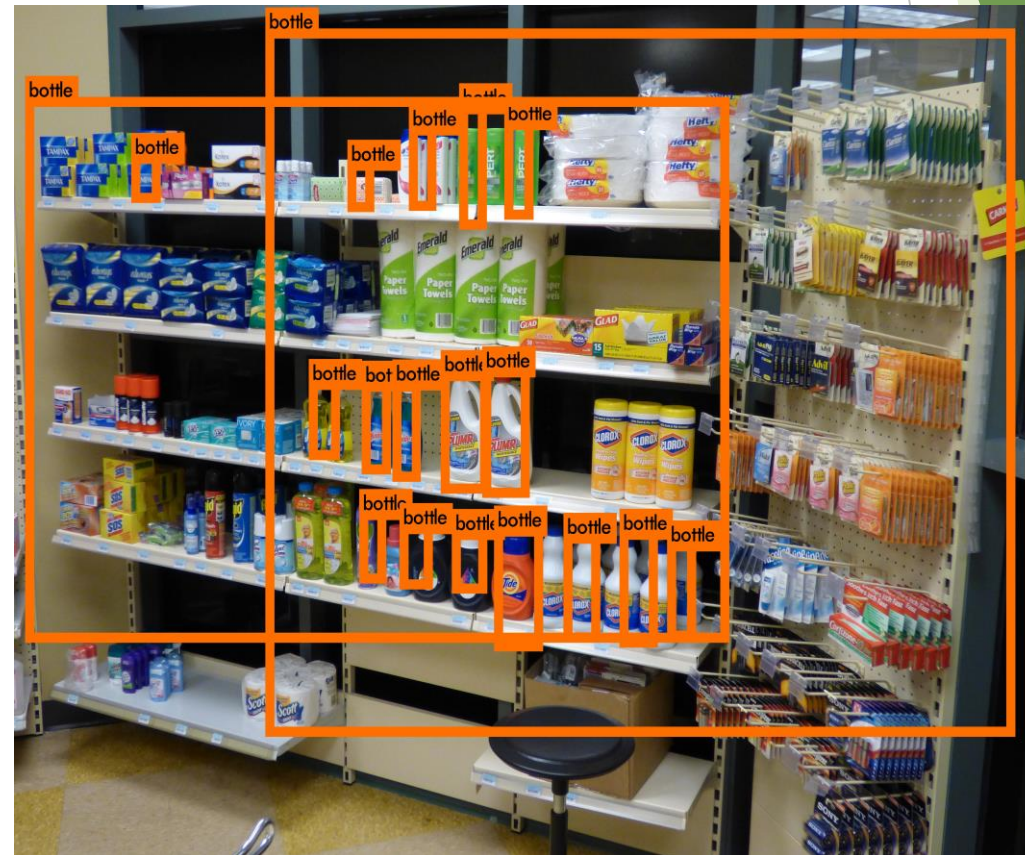


Demo 3

► Image of Shelf



► Output of the ML algorithm



Vision

Hardware & Software: Vision

Multiple RaPi deployment per store:

Multiple cameras with Top as well as side view to capture transactional and inventory related information more accurately.

Current algorithm can only detect the objects and classify the objects into categories based on the side image captured by a camera. We can have a closer camera placed to detect each and every product including its Brand information with much more precision.

Automated Deployment:

Current architecture is a manual process when it comes to adding or changing the software and algorithms. The whole process can be automated using CI-CD techniques which can save a lot of manual effort.

Business Intelligence: Vision

Data Requirement

Sell in data from HUL to Kirana Store which includes following columns

- ▶ Store Information
- ▶ Product information including price
- ▶ Channel information
- ▶ Promotions

Camera data from Kirana Store with more camera set up near entrance and counters. Following information can be captured and created through advance algorithms

- ▶ Footfall activity
- ▶ Gender information
- ▶ Age information
- ▶ Counter Activity
- ▶ Product information

Kirana Store Product Master data

- ▶ Barcode
- ▶ Product information
- ▶ Price

Possible improvement of current Analysis/New Analysis based on new data

GAP Analysis(Anomaly detection to identify Gaps)

Promotion Effectiveness

Sales Person's performance

Product Recommendation

Demand Forecasting

Future Challenges

- ▶ Challenge 1 : Existing basic system in Kirana Stores
 - Not a replacement but a supplementary solution
 - Only Camera-system to be deployed
 - ETL processes to take care of data transformation
 - ML model to decide hardware deployment based on store value, accessibility and promotion area.
- ▶ Challenge 2: Incomplete and inconsistent data
 - ML model to predict faulty data sources and type of inconsistency
 - Methods such as fuzzy logic , NLTK- Wordnet and Vector matching using DL algorithms, LSTM for data -imputation
 - Integration of Web Scraping algorithms to fill current data availability gap



Thank you!