AUTOMATING CUSTOMER TRAFFIC MEASUREMENT USING CCTV

By

Edward Lacanlale, Sharlaine Liang, Micah Paglicawan & Juan Santos

Pointwest Innovations Corporation

Presented by

Sharlaine Louisse Liang

POINTWEST
Agility defined.

16 Years of Service Excellence and Innovation

Talented Digital IT and BPM Resources in PH and US

100% Filipino-Owned IT-BPM Company

Our Services

Digital Services
Customer Experience
Connected Systems
Actionable Data & Insights
Artificial Intelligence
Intelligent Automation

Modernized IT Services

Business Process Management

Who we are

Global Markets We Serve

Healthcare & Insurance

Banking & Finance

Retail & e-Commerce

Supply Chain & Logistics

Transportation & Lodging

Utilities

Media & Entertainment

Government & Public Sector

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

MOTIVATION

- Foot traffic

- Gauging customer interest

- Minimal effort in acquiring data

Objectives of the Research

Data Description

Methodology

Analysis of Customer Traffic

Conclusion and Recommendation

1

OBJECTIVES OF THE RESEARCH

OBJECTIVES

MAIN

To get insights important to store manager with compliance to data privacy

SPECIFIC

- To develop a model for human detection
- To perform an analysis of customer traffic on the data that resulted from the model

2

DATA DESCRIPTION

DATA DESCRIPTION

The data used in this study comes from a collection of CCTV footage from a pawnshop-jewelry store in La Union covering Aug 23-24, 2019. The videos are separated hourly from 8AM to 6PM.

Extracted Variables

Label	Description
Datetime	Year, month, day and time stamp of the video
Staff Area	Number of detected people in the staff area
Rings and Watches	Number of detected people in the store section containing rings and watches
Pawnshop	Number of detected people in the pawnshop section
Necklaces	Number of detected people in the store section containing necklaces
Entrance and Earrings	Number of detected people at the store entrance and in the section containing earrings

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

3

METHODOLOGY

METHODOLOGY

- Region-based Convolutional Neural Network (R-CNN) model with the Inception framework

- Trained on the Common Objects in Context (COCO) dataset

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

POINTWEST
Agility defined.

COCO Dataset

- Large-scale object detection, segmentation, and captioning dataset

- More than 200,000 labeled images

- 80 object categories

COCO Dataset
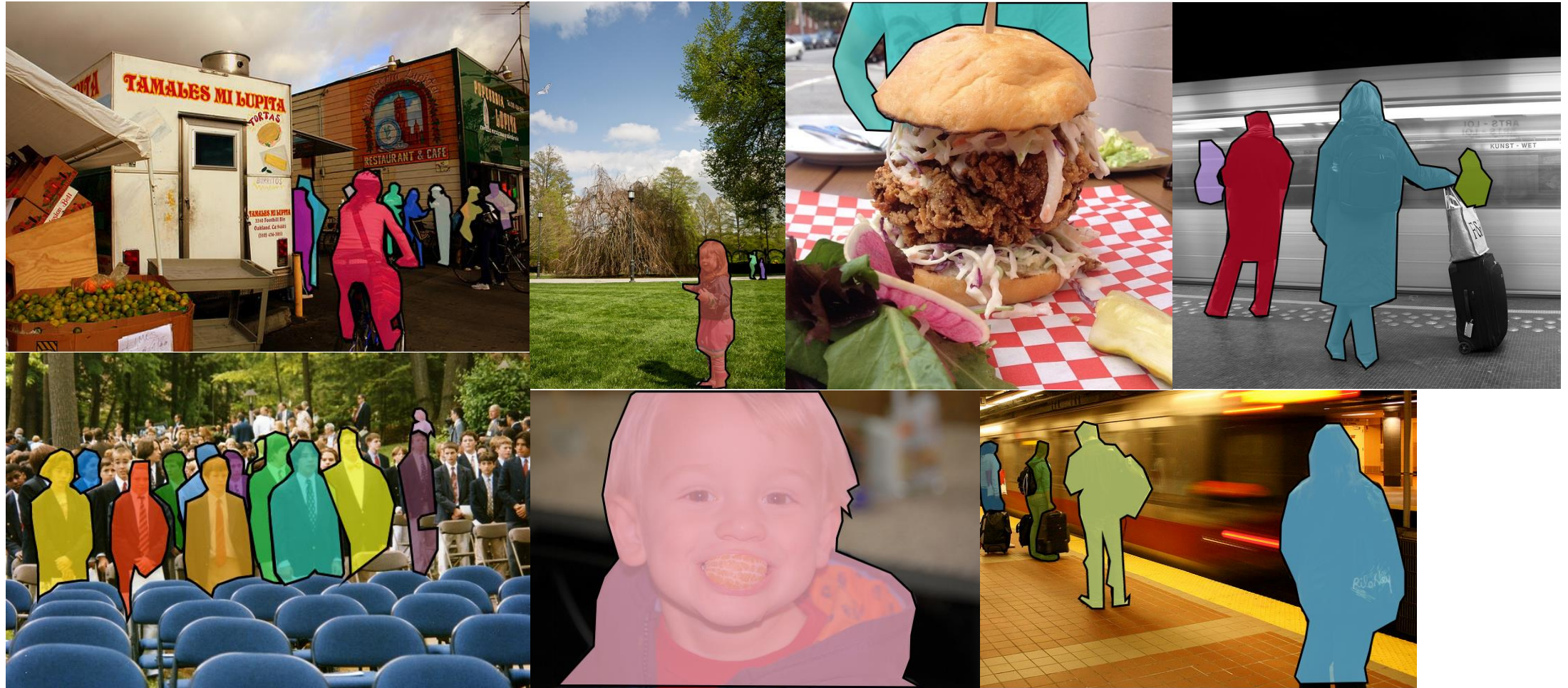
Data Privacy

- Every detected human in each frame is blurred to make them unrecognizable

- The model does not store images

R-CNN MODEL

- Every last frame for each ≈10-second interval is analyzed

R-CNN MODEL

- Each captured frame is partitioned into sections

R-CNN MODEL

- The bottom-middle point of a person's bounding box determines his/her location

R-CNN MODEL

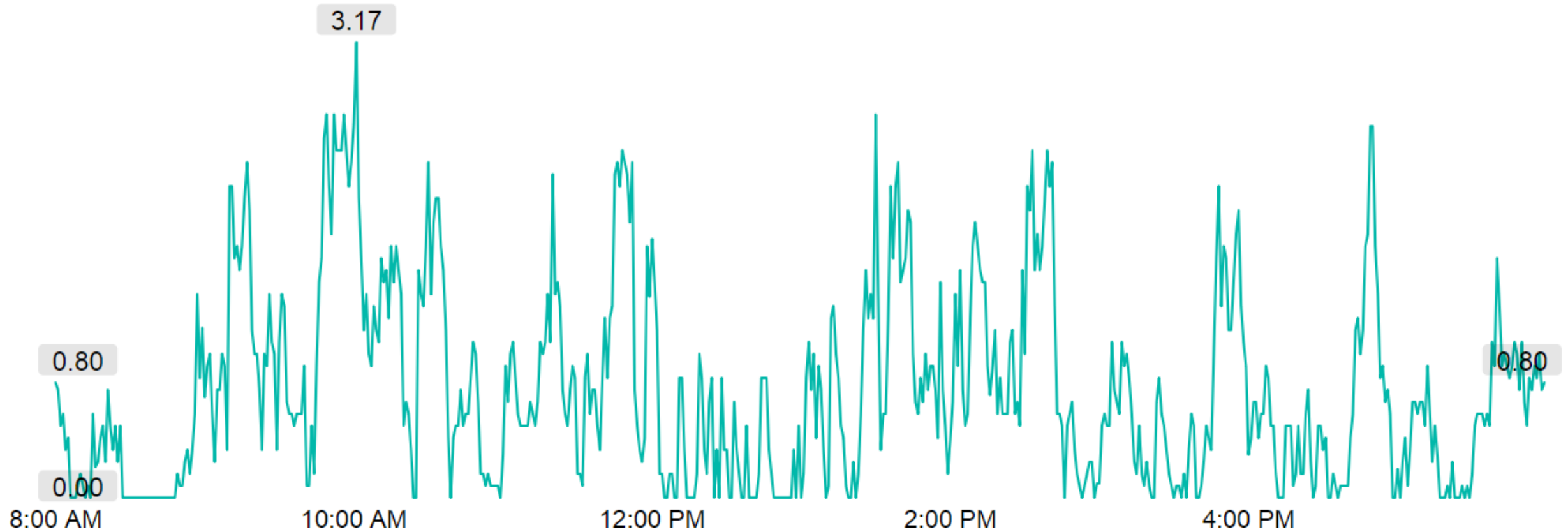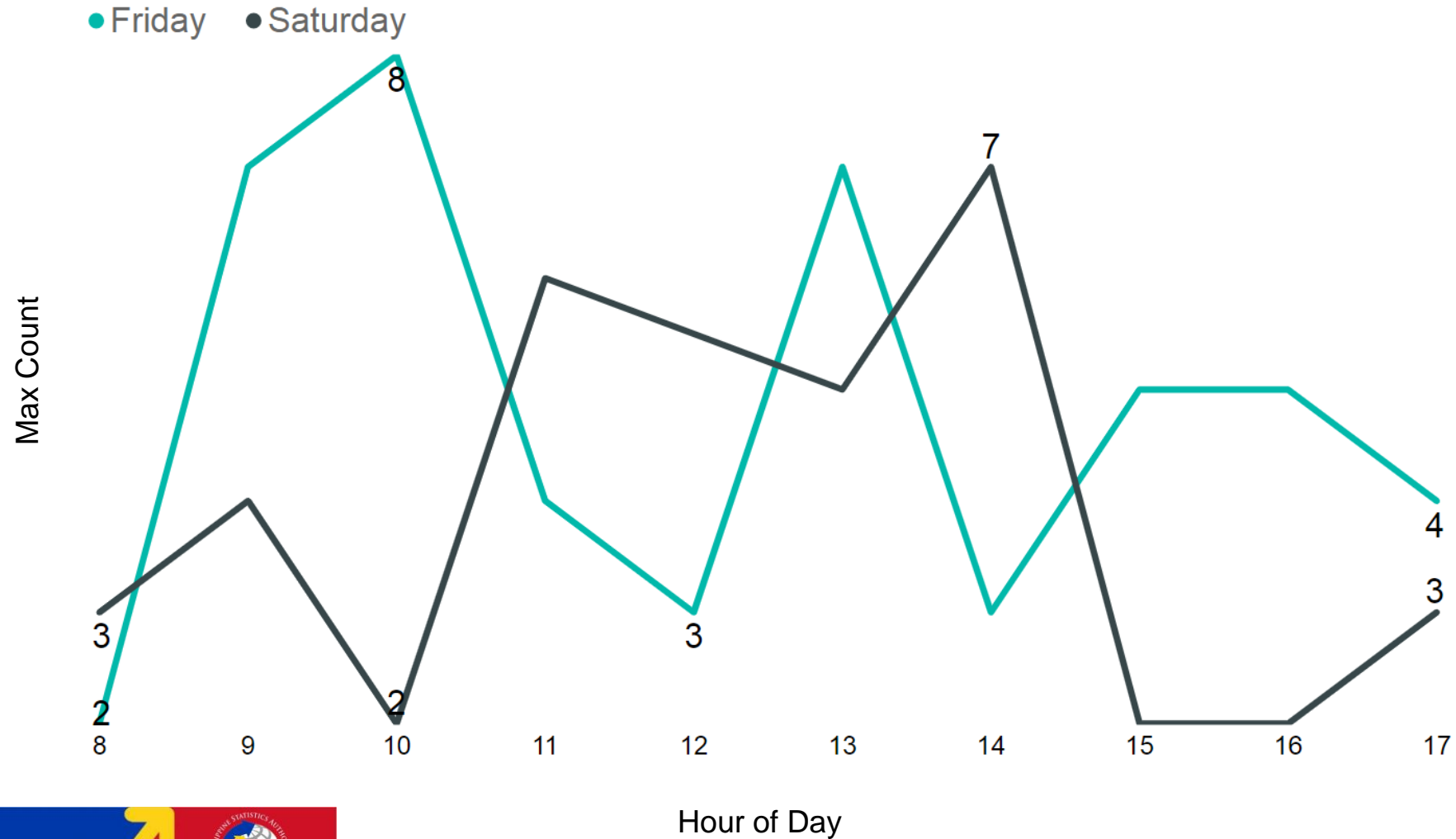- The accuracy of the algorithm is largely dependent on a person's "size" on-camera

4

ANALYSIS OF CUSTOMER TRAFFIC

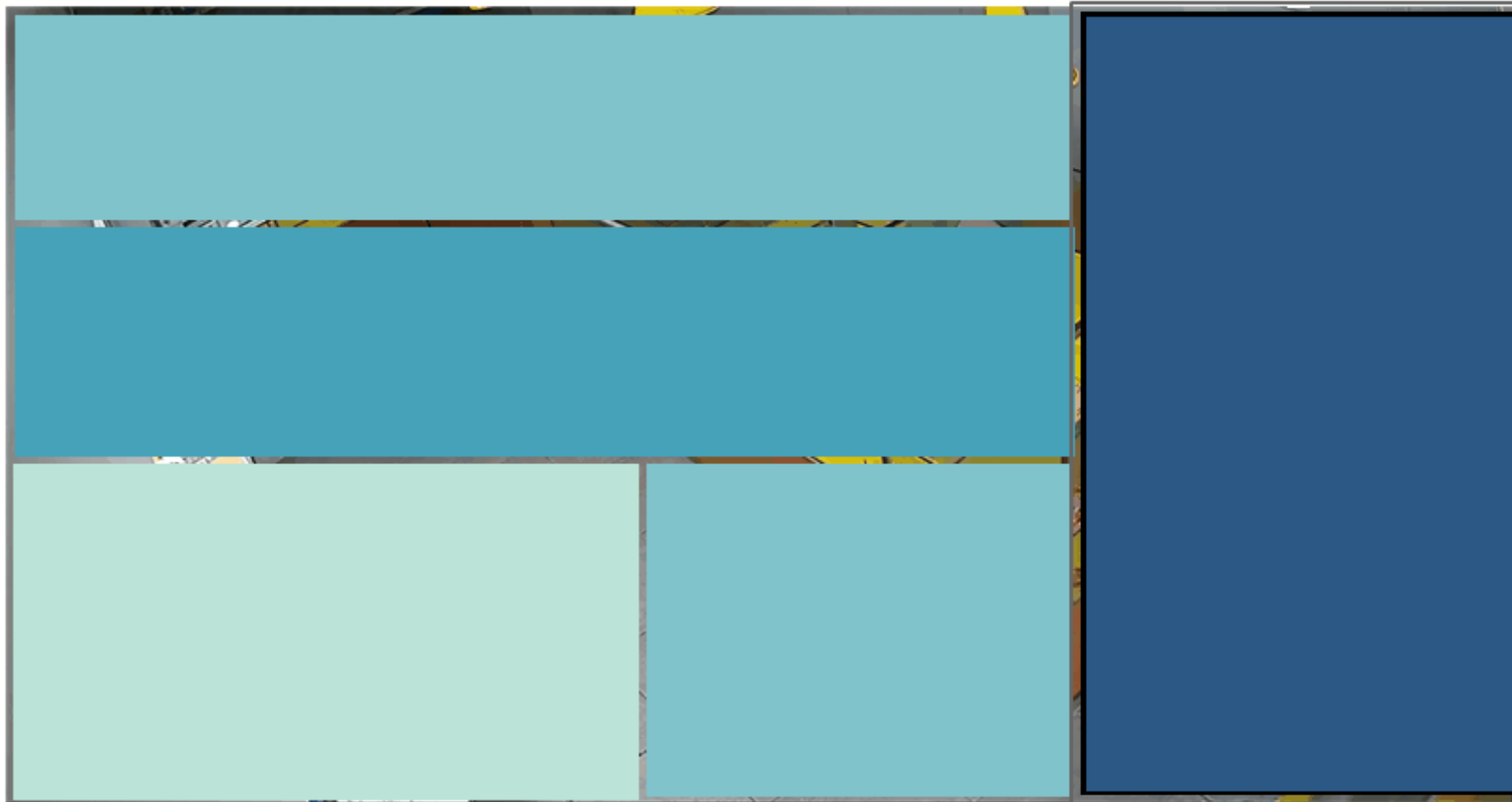# The store is busiest at 10AM with an average of 3 people inside.
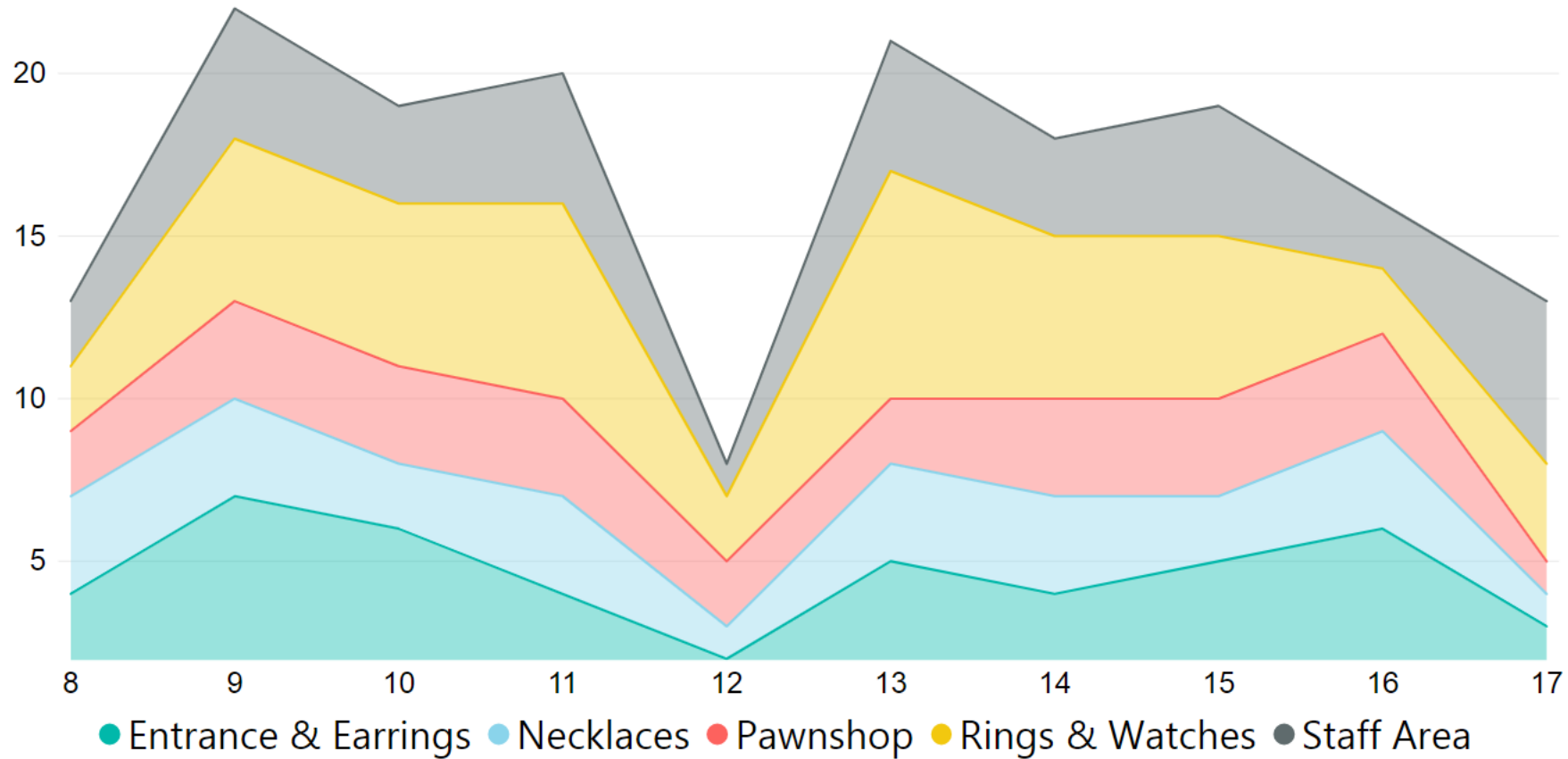
Observed peaks differ between Friday and Saturday

Customer traffic per section changes over time

Rings & Watches (yellow) is consistently the most visited area

5

CONCLUSION & RECOMMENDATION

CONCLUSION

- CCTV is a feasible source of data for market research.

- For the data covered, 'Rings & Watches' consistently has the most number of customers. Also, the store is busiest at 10AM.

- The risk of data privacy is addressed by blurring images and not storing the frames.

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

POINTWEST
Agility defined.

RECOMMENDATION

- Incorporate multiple camera angles and movement tracking to alleviate impact of deterrent objects and to allow for better data

- Include prediction of actions from the customers particularly those that express interest towards a product

- Integrate actual transaction data to correlate data from CCTV and sales

14th NCS National Convention on Statistics

1-3 October 2019 | Crowne Plaza Manila Galleria

Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

POINTWEST
Agility defined.

Thank you!