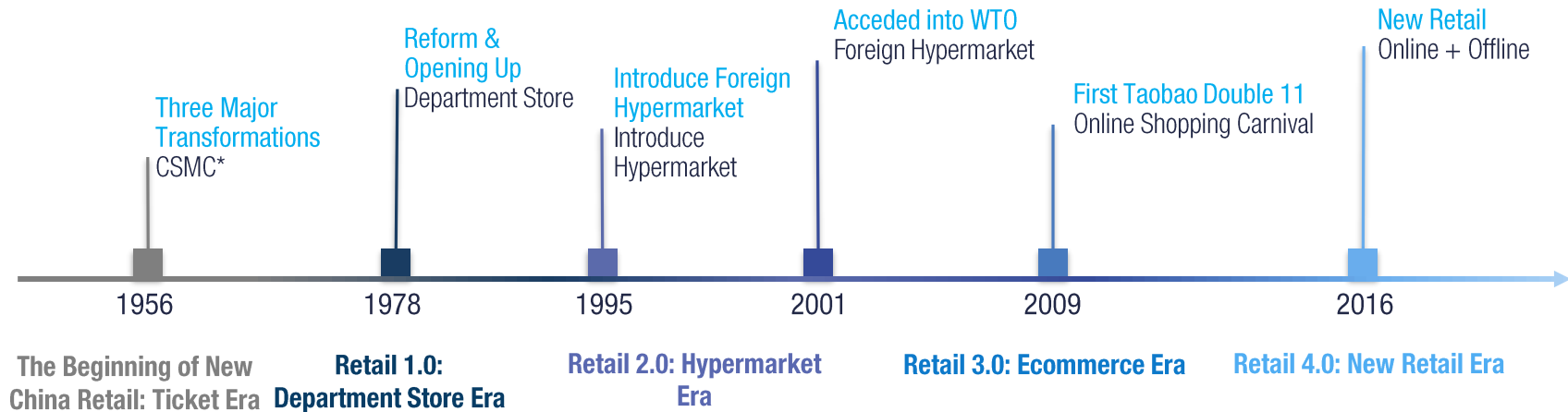# Embedded AI for Smart Retail in China

地 平 线
Horizon Robotics

Dr. Kai Yu
May 22, 2018

The History of Retail in China: Evolution on 3 Hardcores

Three Major Transformations
CSMC*

Reform & Opening Up
Department Store

Introduce Foreign Hypermarket
Introduce Hypermarket

Acceded into WTO
Foreign Hypermarket

First Taobao Double 11
Online Shopping Carnival

New Retail
Online + Offline

1956　　1978　　1995　　2001　　2009　　2016

The Beginning of New China Retail: Ticket Era

Retail 1.0: Department Store Era

Retail 2.0: Hypermarket Era

Retail 3.0: Ecommerce Era

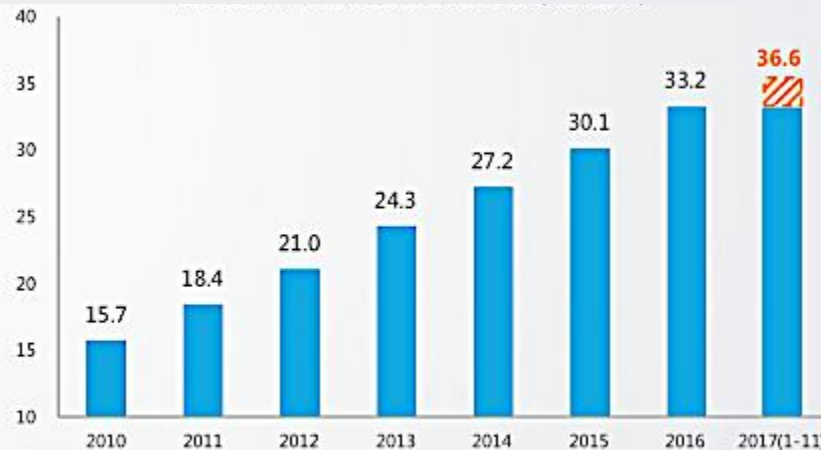**Retail 4.0: New Retail Era**

Products

Service

Consumers

CSMC*: China Supply & Marketing Cooperatives

Fast Growth in Consumer Goods Retail Sales in China

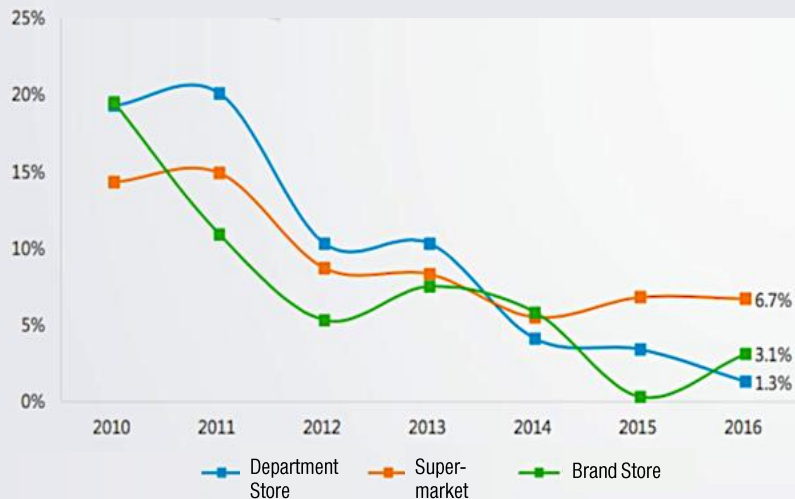The year-on-year sales growth rate of consumer goods and GDP in China

Total sales revenue of consumer goods in China

Source: National Bureau of Statistics

The year-on-year sales growth rate of department store, supermarket and brand store
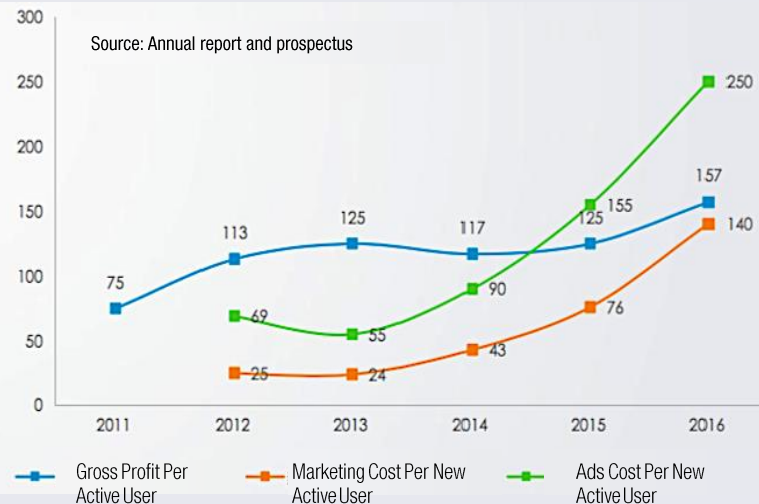
Total sales revenue and growth rate of e-retail

Source: China Electronic Commerce Research Center

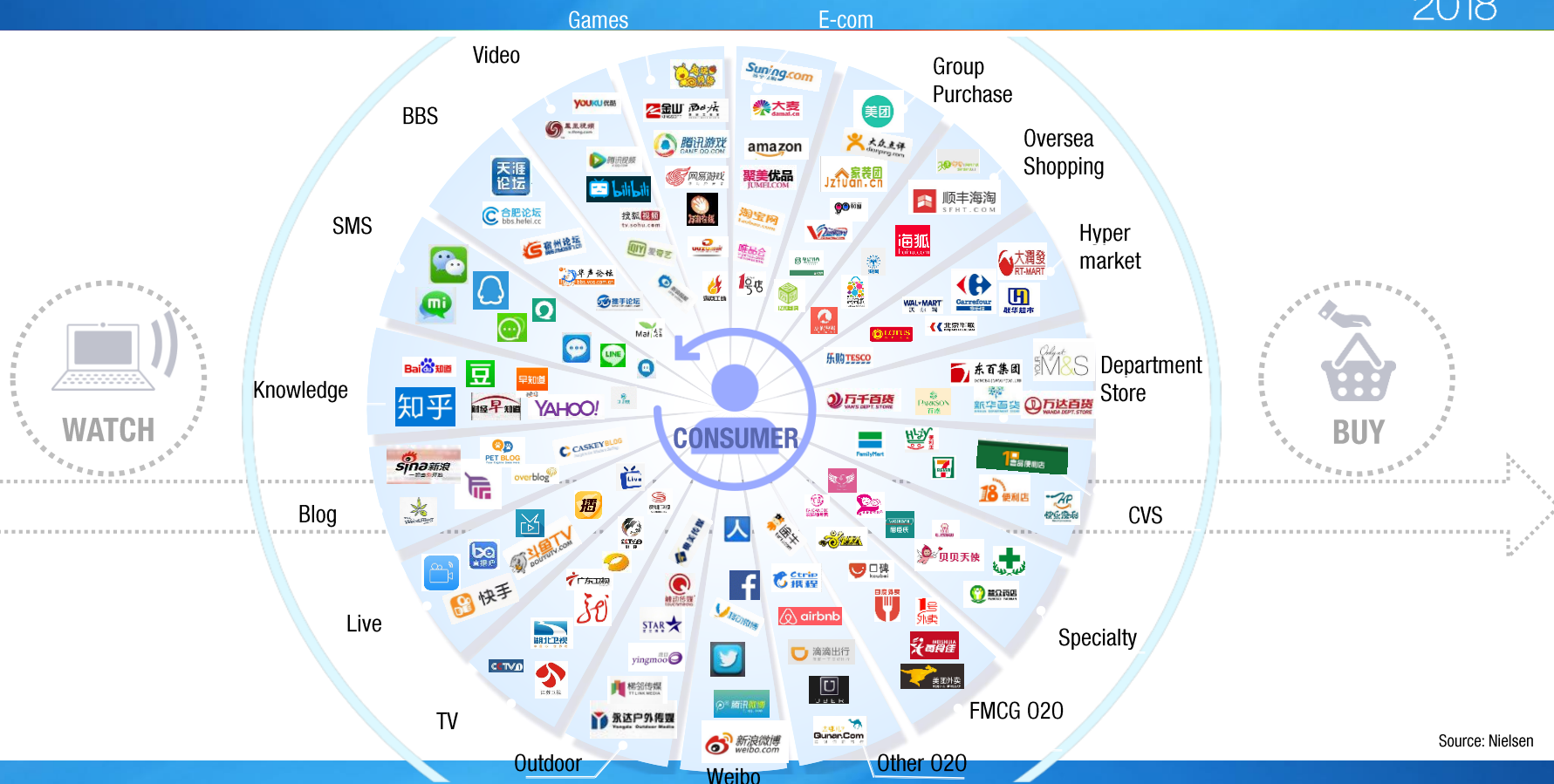# Demographic Dividend of Internet Gradually Disappearing, Increasing Cost of Online Customer Acquisition

Number of Chinese mobile internet users

User Base (100M) — Growth Rate

Related cost estimation of an active user of Alibaba

Source: Annual report and prospectus

Gross Profit Per Active User — Marketing Cost Per New Active User — Ads Cost Per New Active User
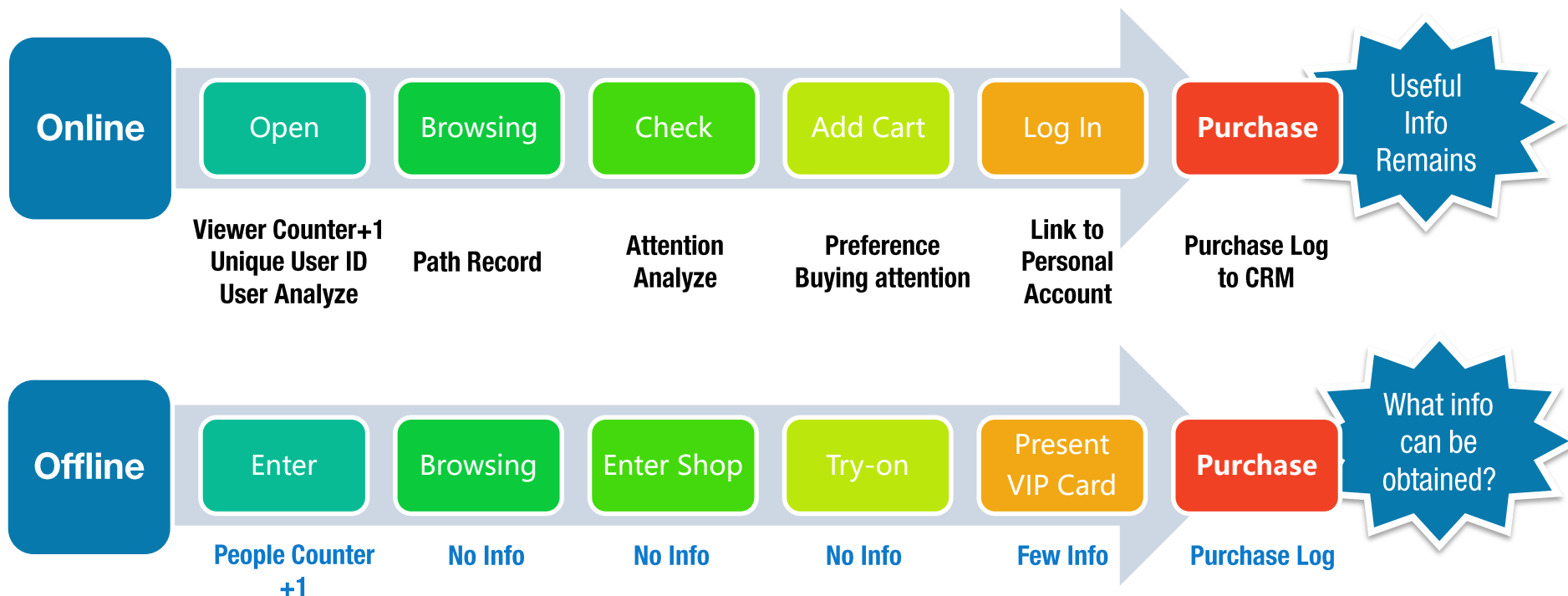
Evolution of Chinese Consumers: Active Information Explorer Instead of Receiver

Source: Nielsen

Offline Retail VS Online Retail Information Transparences

Online

| Open | Browsing | Check | Add Cart | Log In | **Purchase** |

Useful Info Remains

Viewer Counter+1
Unique User ID
User Analyze

Path Record

Attention Analyze

Preference
Buying attention

Link to
Personal
Account

Purchase Log
to CRM

Offline

| Enter | Browsing | Enter Shop | Try-on | Present VIP Card | **Purchase** |

What info can be obtained?

People Counter
+1

No Info

No Info

No Info

Few Info

Purchase Log

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embedded
VISION
SUMMIT
2018

3 + 1 Challenges
Traditional Retailers Face Today

People   Goods   Place

**User
Experience**

Embedded AI Makes Retail Smart

SCAN TO PAY
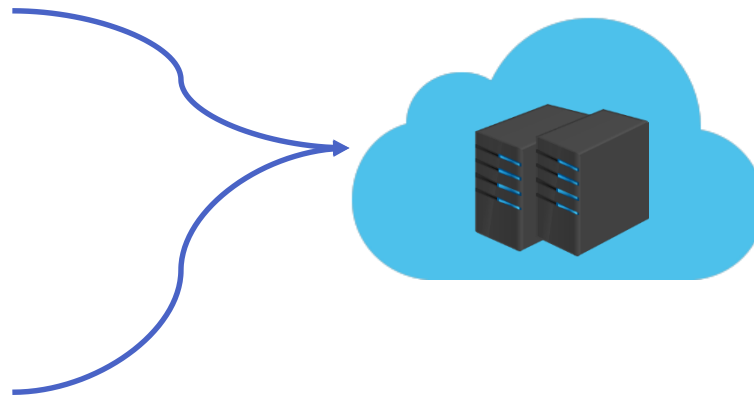

FACE RECOGNITION

UNMANNED STORE

. . .

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Mall

Retail Shop

Boost Staff Efficiency

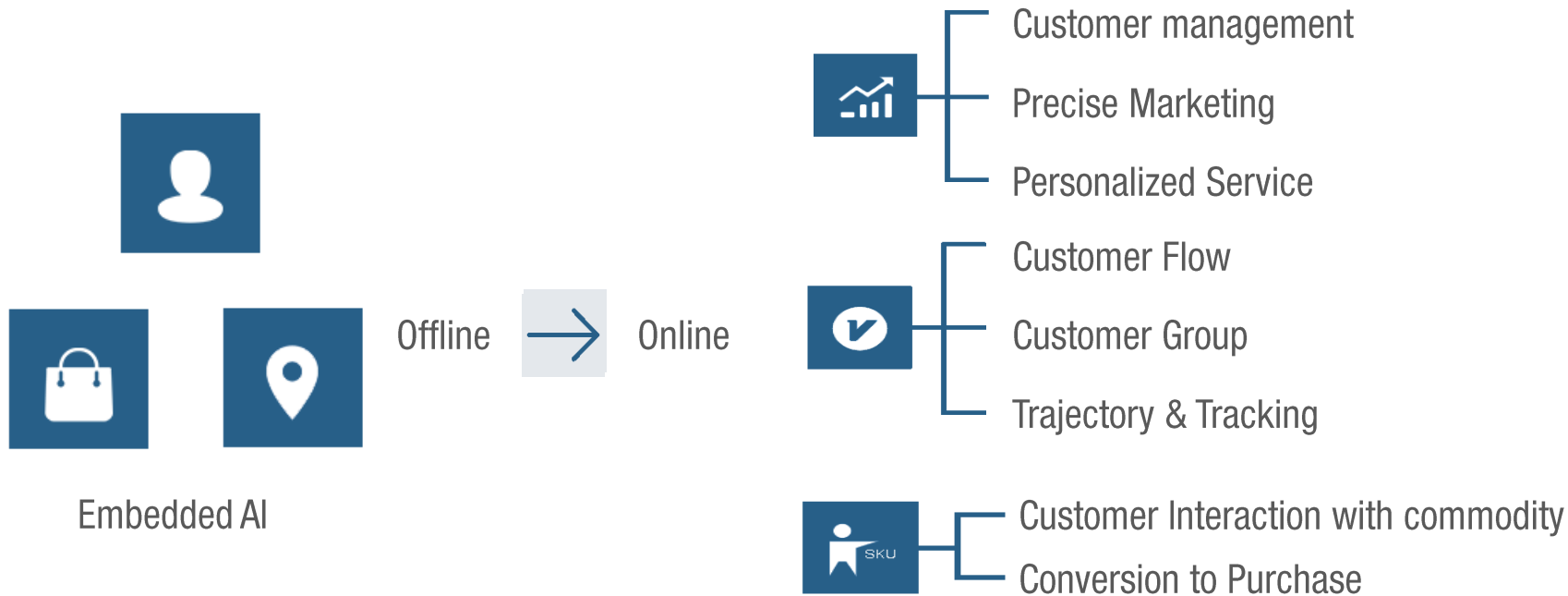Boost Shop Efficiency

Boost Goods Efficiency

Better User Experience

Embedded AI Enables Customer-centric Precise Marketing

Precise Marketing

- Customer flow
- Customer group
- Shopping pattern
- Preference
- Personalized service

- Customer attention
- Customer action (Seen, picked, purchased)
- Product mix
- Inventory & replenishment

- Trajectory
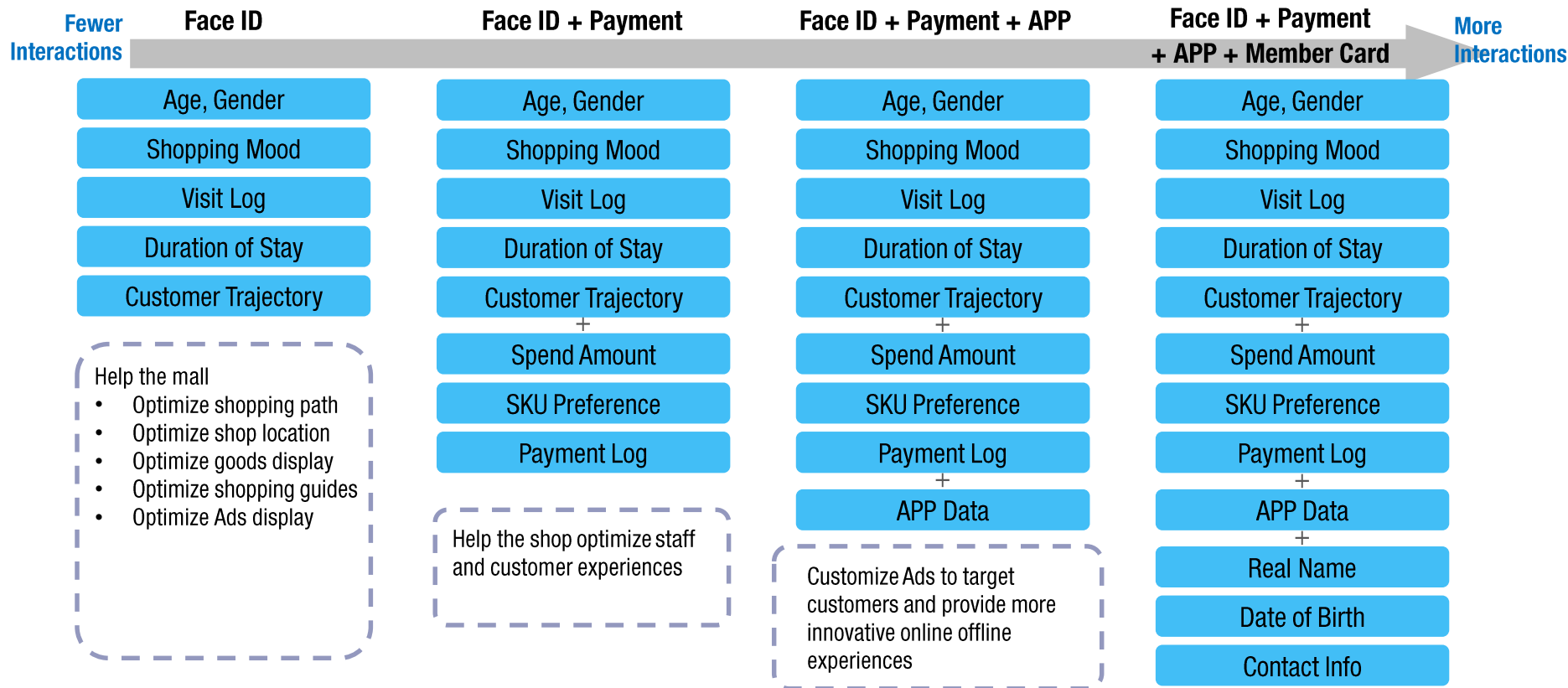- Heatmap
- Shop layout
- Display plan

- Customer analysis & statistics

- Face capture & recognition (combined with membership registration)

- Update on member information (face feature, buying habits, preference)

- Customer localization

- Personalized customer service

- Customer attention on specific product

- Record & analysis of product combination

- Optimization of product display

- Shelf-space monitoring, trigger of stock replenishment

- Customer localization & trajectory

- Heatmap of customer loitering

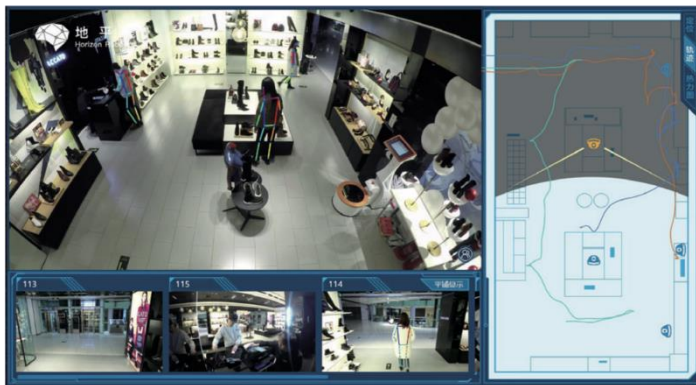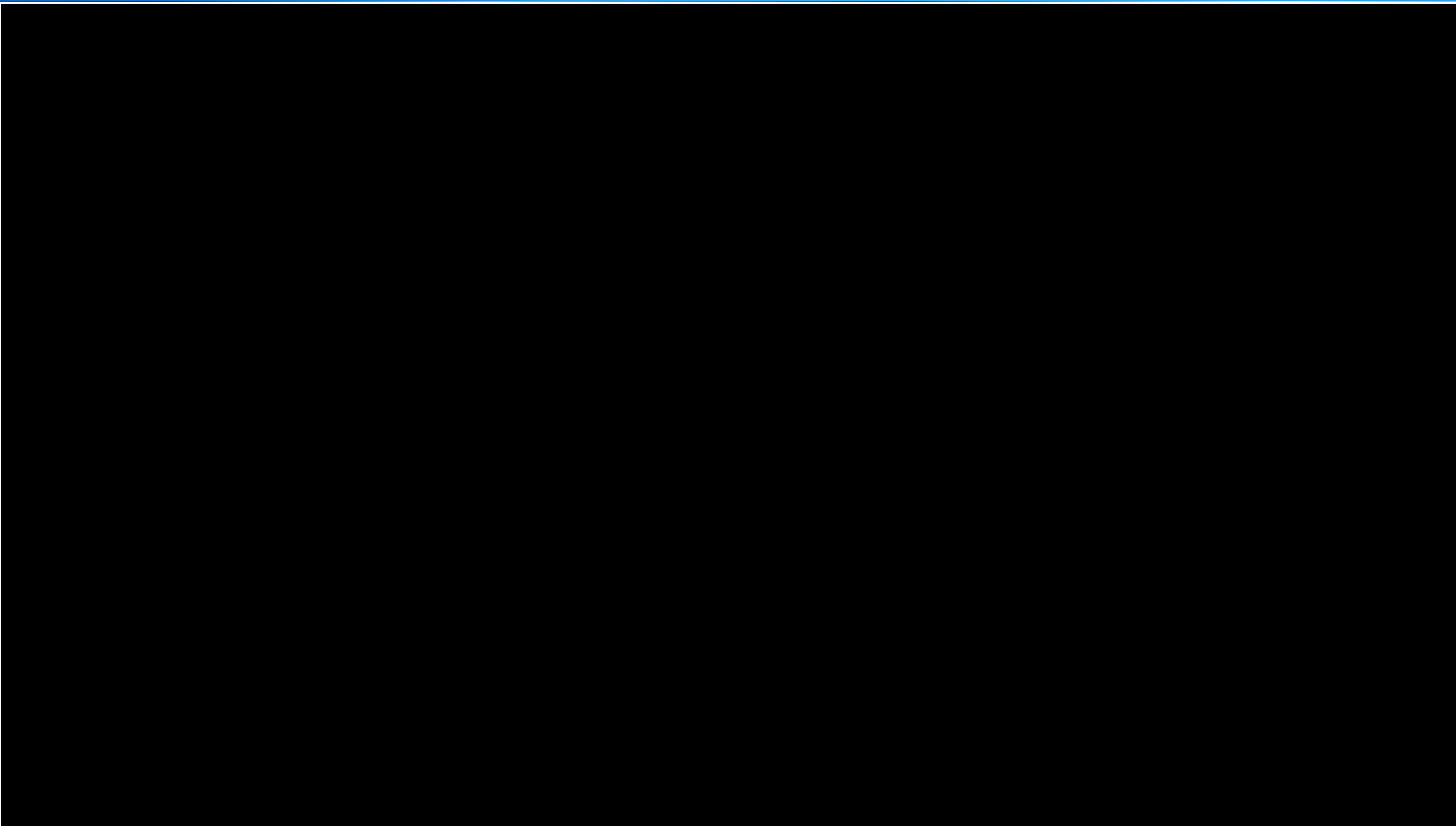- Optimization of store layout
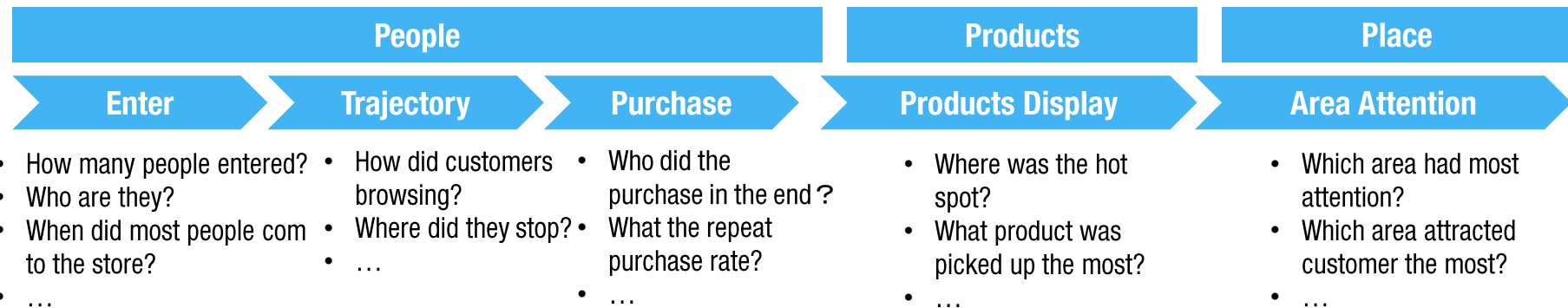
- Evaluation of promotion

Customer management

Precise Marketing

Personalized Service

Customer Flow

Customer Group

Trajectory & Tracking

Customer Interaction with commodity

Conversion to Purchase

Offline → Online

Embedded AI

L1
provide standard data report

L2
data analysis and interpretation

L3
provide consulting services and solutions
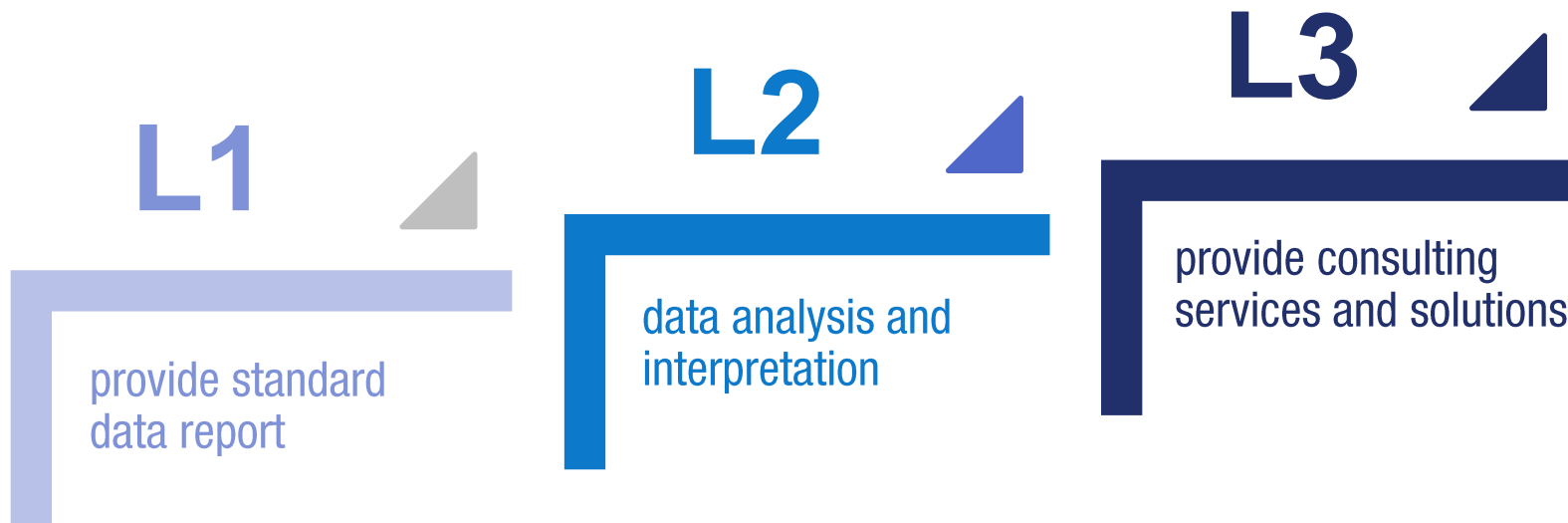
Building-up Full User Portrait upon Deeper Understanding of Consumption & Interaction Behaviors

Fewer Interactions ➡️ **More Interactions**

Face ID	Face ID + Payment	Face ID + Payment + APP	Face ID + Payment + APP + Member Card
Age, Gender	Age, Gender	Age, Gender	Age, Gender
Shopping Mood	Shopping Mood	Shopping Mood	Shopping Mood
Visit Log	Visit Log	Visit Log	Visit Log
Duration of Stay	Duration of Stay	Duration of Stay	Duration of Stay
Customer Trajectory	Customer Trajectory +	Customer Trajectory +	Customer Trajectory +
	Spend Amount	Spend Amount	Spend Amount
	SKU Preference	SKU Preference	SKU Preference
	Payment Log	Payment Log +	Payment Log +
		APP Data	APP Data +
			Real Name
			Date of Birth
			Contact Info

Help the mall
- Optimize shopping path
- Optimize shop location
- Optimize goods display
- Optimize shopping guides
- Optimize Ads display

Help the shop optimize staff and customer experiences

Customize Ads to target customers and provide more innovative online offline experiences

People			Products	Place
Enter	**Trajectory**	**Purchase**	**Products Display**	**Area Attention**

- How many people entered?
- Who are they?
- When did most people com to the store?
- …

- How did customers browsing?
- Where did they stop?
- …

- Who did the purchase in the end？
- What the repeat purchase rate?
- …

- Where was the hot spot?
- What product was picked up the most?
- …

- Which area had most attention?
- Which area attracted customer the most?
- …

People Counter, Age, Gender

Tracking Indoor Trajectory

Face ID the paying customer

The product being noticed/ location/frequency

Heat map

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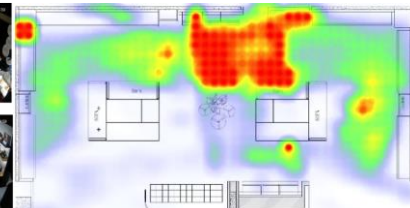
Customer recognition and notice of re-visited customer

Capture customer action and build up customer portraits

Frequent Customer ID：2004587
Gender： Female
Age： 20-30
Date： 2017/10/27
Place： XXX
Times： 23 times

Connect to CRM system, once a member visited, store staff will get the notification.
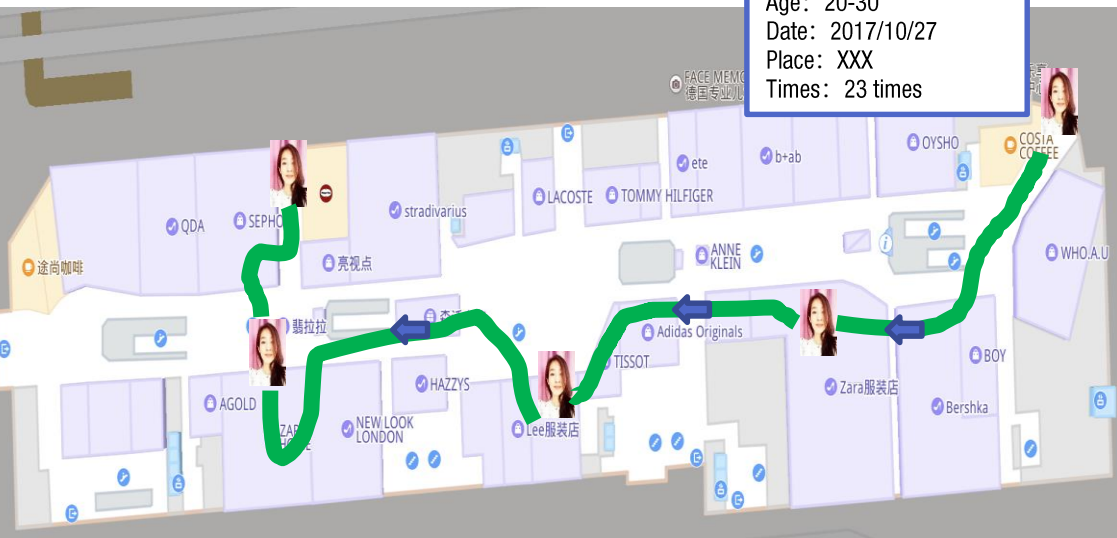
Build up a three-dimensional customer portrait using customer trajectory, attention history and trials records.
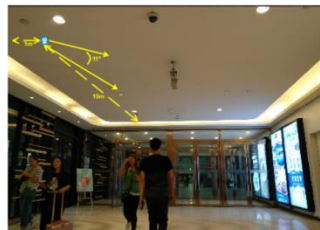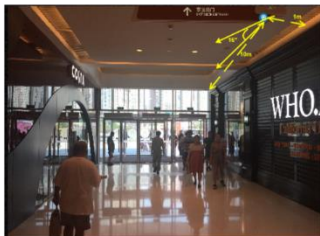
Entrance

Pathway
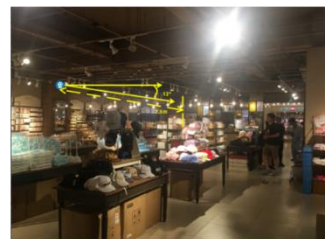
Boutiques

Video

- **Inbound/outbound people count**

- **Gender**

- **Age group**

- Inbound & outbound flow at each entrance/exit

- Statistics of customer gender group
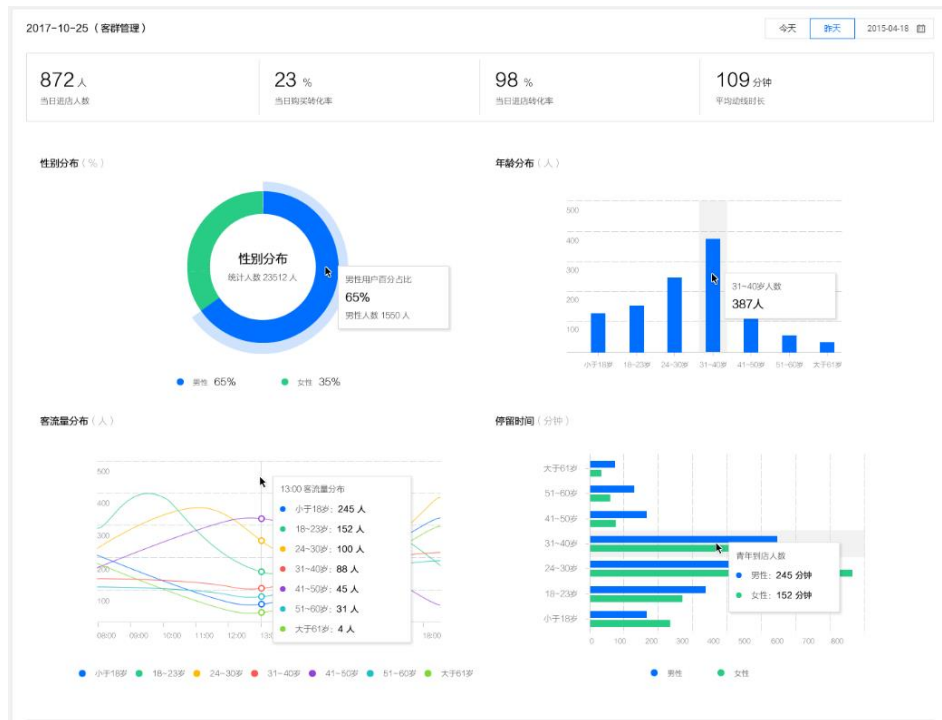
- Virtualized report for customer flow

- **Face feature**

- **Member recognition**

- **Employee recognition**

- **Re-Identification**

Entrance

Pathway

Boutique

Cashier counter

Customer Trajectory
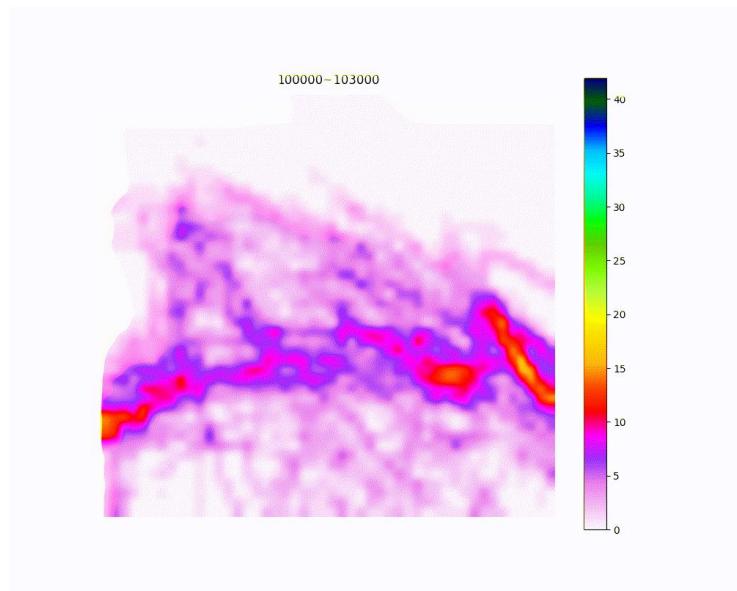
Customer Movement
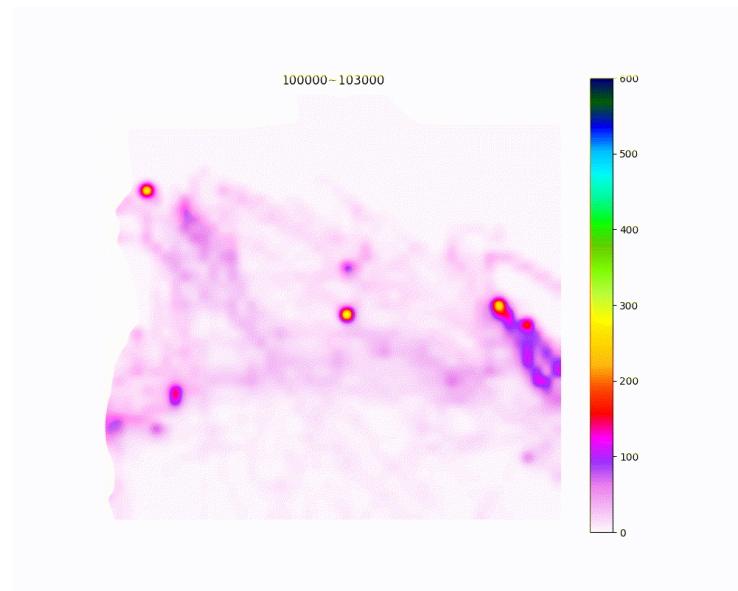
Customer Loitering

❖ Which SKU are seldom tried?

❖ Which SKU are frequently tried but seldom purchased?

❖ Which SKU have similar problems?

❖ How to make production forecast for new models?

→

AI Camera

Shelf Weight Sensor

Detect interaction between customer & goods

Face ID
Unique identity of customer

Shelf Sensor
Detect customer interaction with goods

Conversion Rate Analysis

98 trials, 2 sales
2% sales conversion

46 trials, 13 sales
28% sales conversion 2

Sales Forecast
Based on Trials

Sales Conversion
Anomaly Analysis

C2M Based on
Customer Reaction

SKU with high trial ranking & low sales ranking, on shelf at least 3 weeks

| SKU	Trials per Day	Trials Ranking	Offline Sales Daily	Sales Ranking	On-Shelf Date	Daily UV Online	Sales Ranking	Online Sales Daily	Sales Ranking	On-Shelf Date	Return Rate
	24.0	17	4.7	80	2018/2/10	7280	33	0.13	63	2018/2/23	0%
	20.0	30	5.0	73	2018/2/10	4679	61	0.19	46	2018/2/23	9%
	1.6	42	3.3	103	2018/1/2	2865	99	0.21	82	2018/1/2	27%
	1.3	54	3.0	110	2018/1/5	4489	63	0.09	139	2017/12/27	10%
	1.3	57	2.1	135	2018/1/27	2147	124	0.14	102	2018/1/15	18%
	1.2	65	4.5	82	2018/2/3	2018	130	0.08	155	2018/1/22	20%

Embedded vision and AI technologies can transform retail business

Help retailers better understand customers

To provide better and tailored customer experience
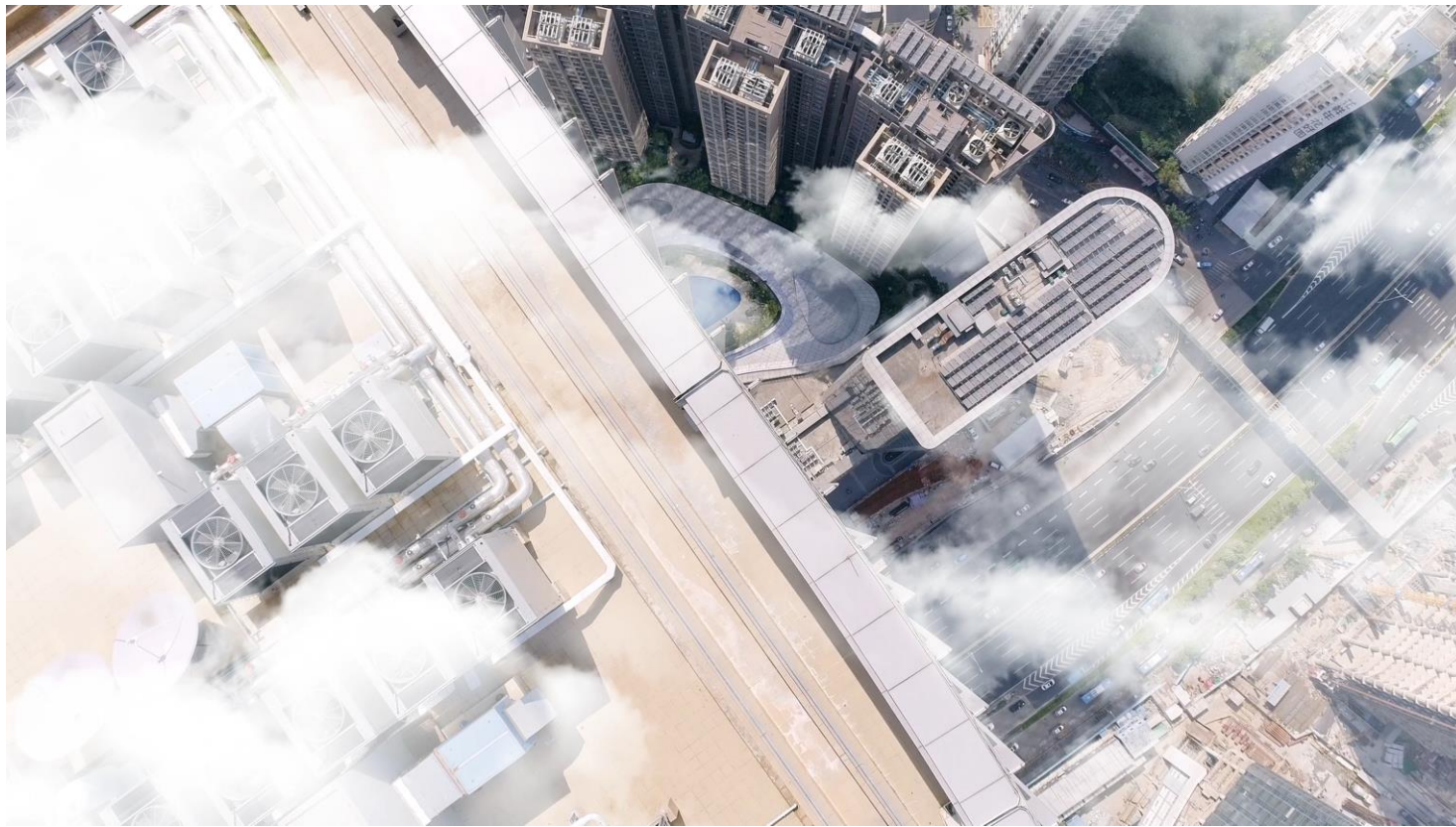
Thank you!

And welcome to visit our booth
#504 in Embedded Vision
Summit