



Vienna, Austria Aula der Wissenschaften

# Al Analytics in Escalator Safety Incident Management

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# **Transit oriented communities**

#### MTR in Hong Kong manages

- **15** shopping malls, **5** commercial/ office buildings
- >118,000 residential units
- >820,000 sq. m. commercial and office space

- 98 stations in Heavy Rail Network
- 271 km
- 1 station in High Speed Rail
- 26 km (Hong Kong Section)





# Keep Cities Moving 讓城市前行

- >5 million average weekday patronage
- >99.9% passenger journeys on-time on Heavy Rail Network





MTR operates one of the **largest escalator fleets** in Hong Kong, consisting of **over 1200 units** in railway stations that serve approximately **5 million passengers** daily.



# **Overview of Escalator Safety**





# **Demographic of Persons Involved**

involved Elderly (age>65).

Case % by Age Q2 2023 - Q1 2024 (5% Q2 2022 - Q1 2023 5%) 39% 489 (56% (47%) **Over half** of the escalator accidents 0-11 12-64 >65



# **Escalator Safety Campaign**

Using popular cartoon character as Escalator Safety Campaign Ambassador.

- Passenger announcements, Posters and Videos launched in stations and social media.
- Key message include
  - "Stay alert. Don't bump into others"
  - "Always use the lift if you have baggage"
  - "Stand firm on either side and hold the handrail. Take care of children and the elderly."
- MTR Safety Experience Zone to promote safe behaviour through interactive challenges.





## **Focus Group Promotions**



Escalator promotion with primary school students

Elderly engagement event with escalator promotion







### **A.I. Analytics**

• Dashboards for safety incidents

Monitor trends of passenger escalator safety incidents.

Smart Escalators for asset health

Monitor status and faults in escalators.

#### **Find Useful Solution**

Communicate closely with customers to understand the data and their needs.

#### **Empower and Collaborate**

Staff are eventually empowered to access relevant information. Through sharing, knowledge and idea exchange fosters a collaborative culture.

#### **Identify Problem**

Data Studio listen actively to find out existing pain points of the customers and identify a data solution that is most suitable to solve the pain points.

#### **Development Process**



#### **Escalator Safety Performance Dashboard**





# Escalator Accident - Cause analysis

- Passenger demographic
- Weather
- Shoe Type
- Did passenger hold the handrail?





# Escalator Accident - Trend monitoring

- Daily Cases Overview
   Cases and injury counts.
- Comparison across different years Compare cases in the same month last year.







Dot Colors: ● Band 5 (Case >= 40) ● Band 4 (20 to 39 Cases) ● Band 3 (15 to 19 Cases) ● Band 2 (10 to 14 Cases) ● Band 1 (0 to 9 Cases) Dot Sizes : Smaller ○ = Less cases, Larger ○ = More cases Arrow: ↓ Improving trend ↑ Worsening trend − Steady trend





## **Data-Driven Actions**



#### **Escalator Speed Reduction Plan**

Based on the analytics result, an extensive plan to reduce the speed of escalators in stations was launched. This is a novel, proactive and data-driven approach taken by MTR to mitigate escalator accidents.



#### **Targeted Station Assistant Deployment**

- 1. Station assistants were deployed according to the analytic result of sick passenger cases.
- 2. Escalator Station Assistants were deployed at escalators with high accident rate.



# Escalator Asset Management

#### **Escalator Asset Information**

- Location of the escalator
- Maintenance records
- Equipment parameters
- Fault history





**Smart Escalators** 



**Instant Supervision** 

7\*24 Real-time Monitoring



Automatic Push-based Alert





Asset Information & Dashboard with Predictive Algorithm



- Rule-based Alert
- Al Trends and Pattern Recognition Algorithms



# **Health Monitoring Algorithms**



#### Instant Alerts





**Connected Persons** 





Facility Control Center



Front Line Maintainer





**Station Staffs** 



# Thank you for your attention!

