

Security Level:

# AIOps

Huawei IRC Ops Team

[www.huawei.com](http://www.huawei.com)

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HUAWEI TECHNOLOGIES CO.,  
LTD.



# **Huawei Mobile Service Introduction**

# Huawei users concentrating on efficiency & fun, quality & fashion



## Mobile-first



Average daily use of  
mobile phones

**6.6hours**

## Athletic



Users that walk more than 6,000  
steps a day on average

**57%**

## Social



Social app users

**97%**

## Fashionable



Users who spend an average of  
more than an hour a day listening  
to music or watching videos

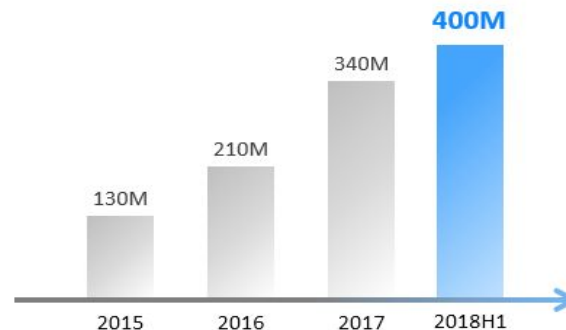
**70%**

# High-speed growth of global Huawei Mobile Services

Coverage area of Huawei Mobile Services



Global user number of Huawei Mobile Services



- Covering **170+** countries/regions, global users with annual increase of **60%+**, reached **400+ mn**
- Users in China keep growing, mainly located in Guangdong and Jiangsu province
- Users outside China reached **40+ mn**, 92% located in Europe, Latin America, Middle East/Africa and Asia Pacific

500TB+ data per day Ops data

60+ thousand of machines

Huawei Mobile Phone sells keep rapid growth, which means that Huawei Mobile service will growth rapidly in the next years.

# AIOPs Dash Board

MAKE it  
**POSSIBLE**



**AIOPS**

# AIOps Overview

MAKE IT  
**POSSIBLE**

## Artificial Intelligence for IT Operations

Every year the management of Cloud Operations is more complex

- Increase in IT size, and event and alert volumes
- Digitalization with cloud, mobile, microservices
- Edge, IoT, serverless, ...

*To deal with this complexity, businesses are turning to AI to automate incident management across production stacks, including application, infrastructure, and monitoring tools.*

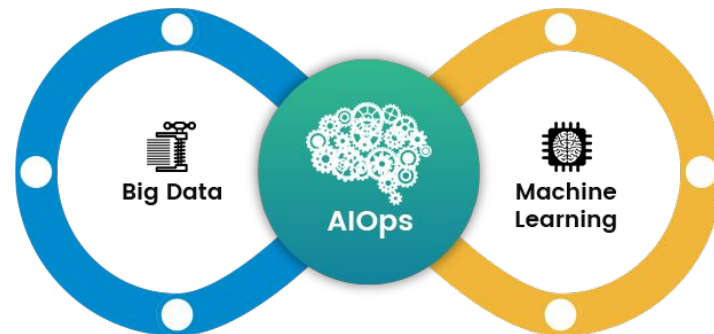
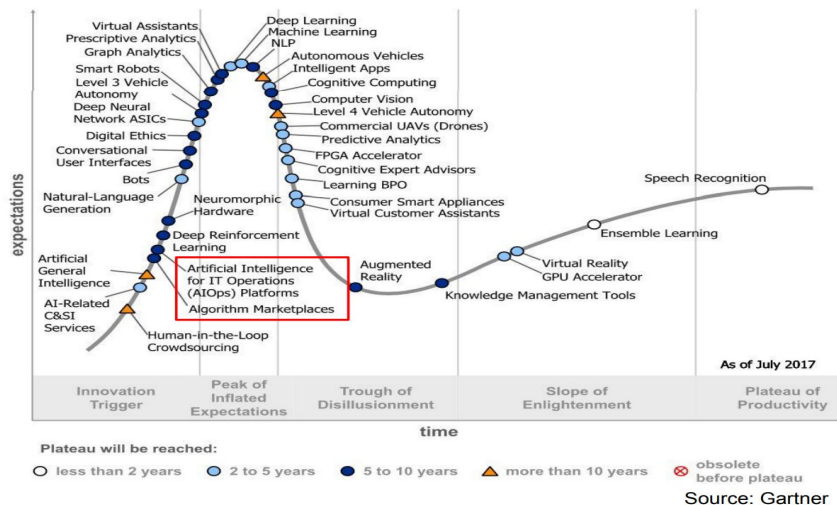


Figure 1. Hype Cycle for Artificial Intelligence, 2017



### Ambition:

AIOps aims to get ahead of and resolve problems before they happen, leading to substantial decrease in OPEX and CAPEX costs.



## Research Areas

- 1- Anomaly Detection (uni and multi variate)
- 2- Active Learning (Human-in-the-loop)
- 3- Fault Diagnosis and RCA
- 4- Dynamic Resource Management
- 5- Time Series Classification
- 6- Natural Language Processing



## Applications in AIOps

- 1- AD for Cloud Services KPIs (CDN Download Success Rate, Video Download Failure rate, Account Client Delay, etc.)
- 2- Optimizing Execution of Spark Jobs.
- 3- Root Cause for low download success rates.
- 4- Services Load Balancing



## AI Techniques

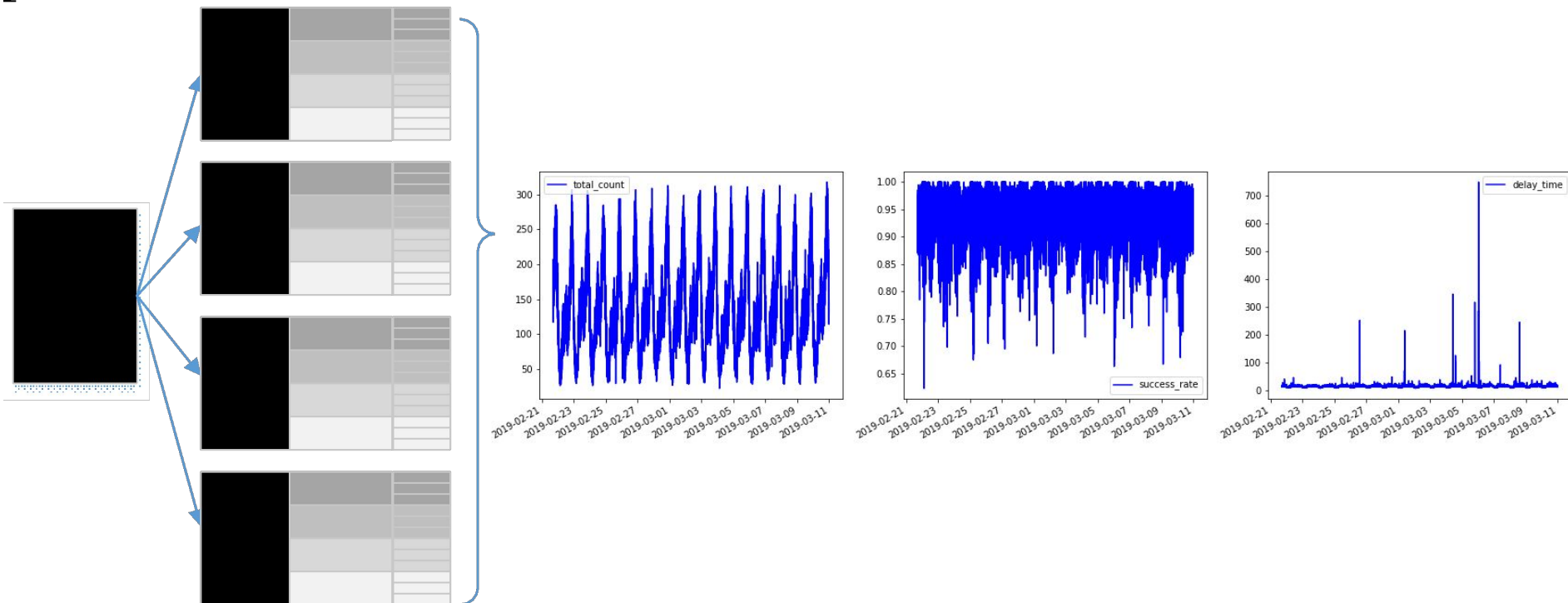
- 1- Statistical Techniques (Boxplot, ARIMA, SARIMA, Holt-Winters, etc.)
- 2- LSTMs and its variations applied to time series data
- 3- CNNs applied to time series data
- 4- Autoencoders and its variations (e.g., Sparse, denoising, etc.)
- 4- Attention Models
- 5- Clustering based techniques (e.g., DBSCAN)
- 6- AutoML for time-series



# IRC AI Ops Progress and Challenges

## Problem and System Description

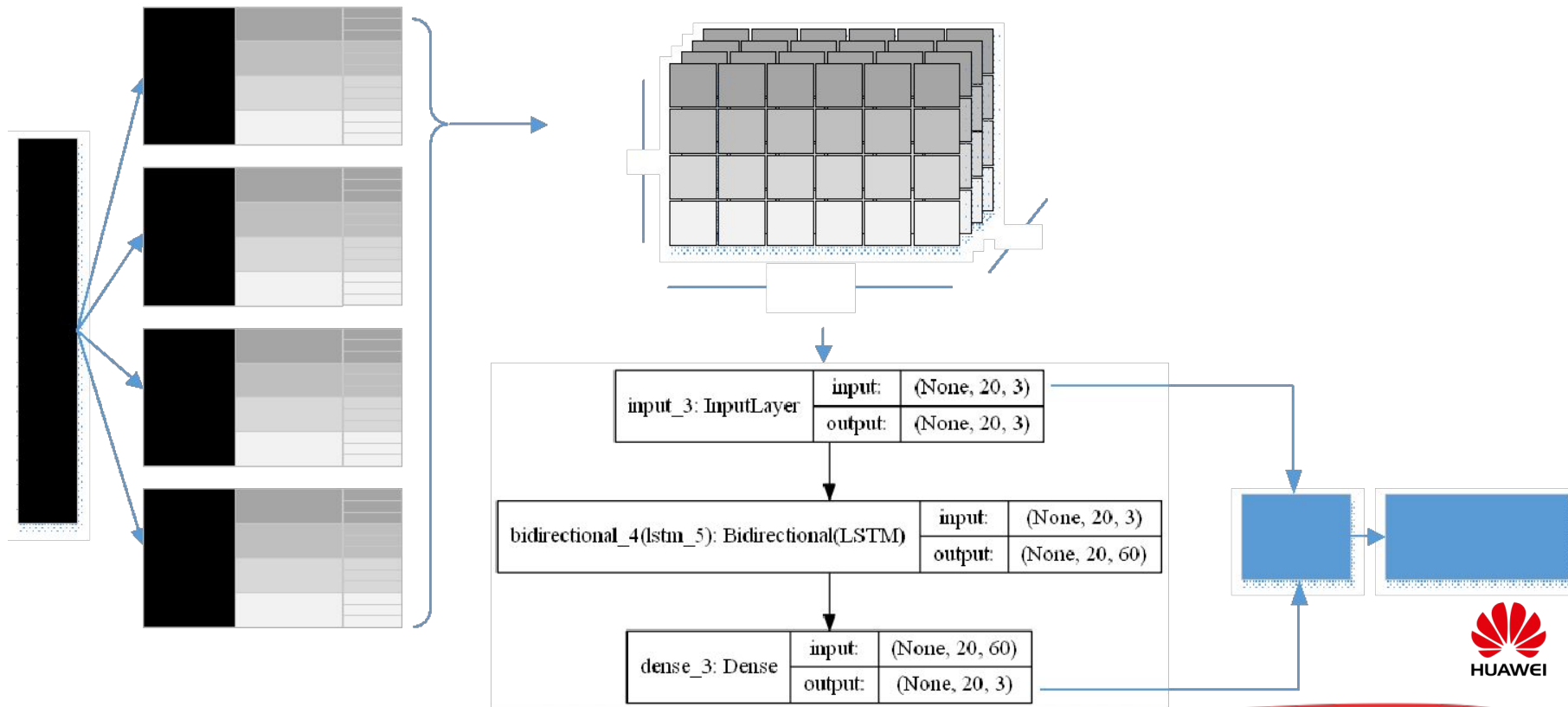
MAKE it  
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# IRC AI Ops Progress and Challenges

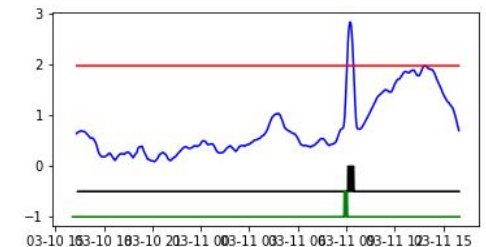
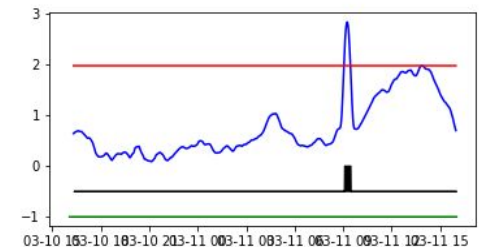
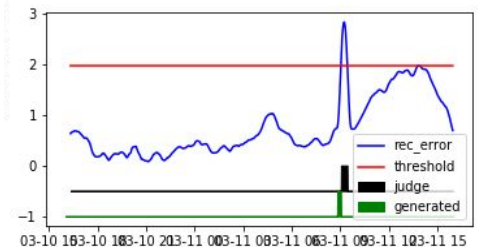
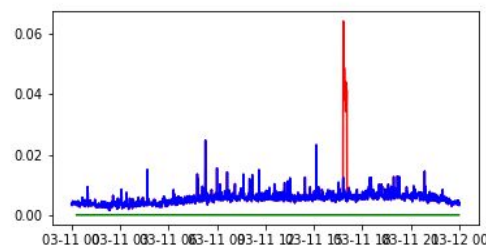
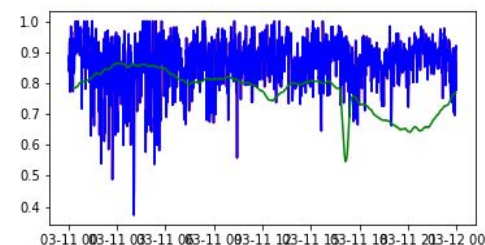
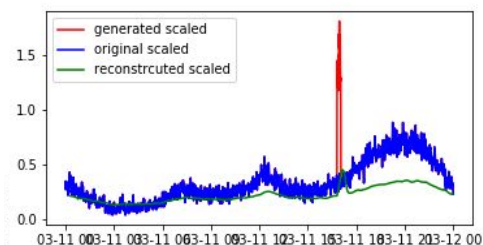
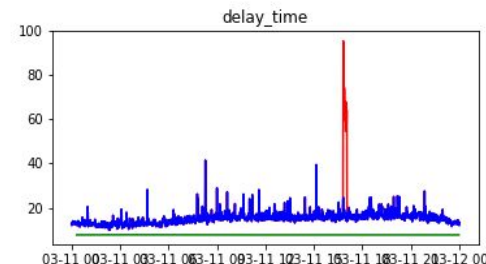
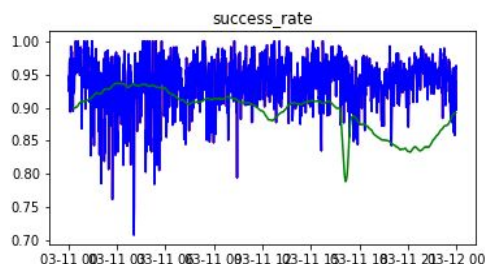
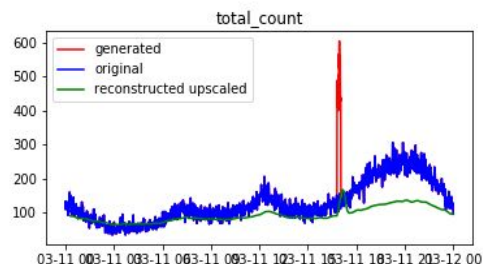
MAKE it  
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## Multi-KPI anomaly detection – LSTM Bi-directional Autoencoder



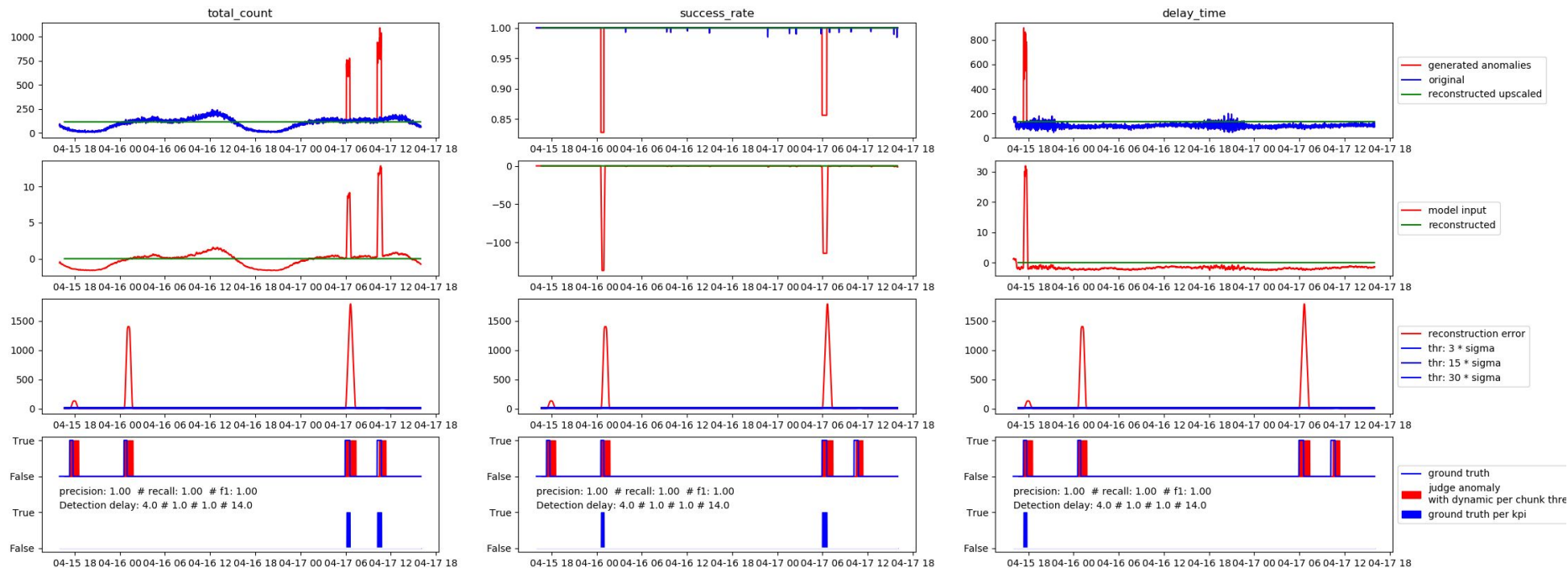
# IRC AI Ops Progress and Challenges

M1



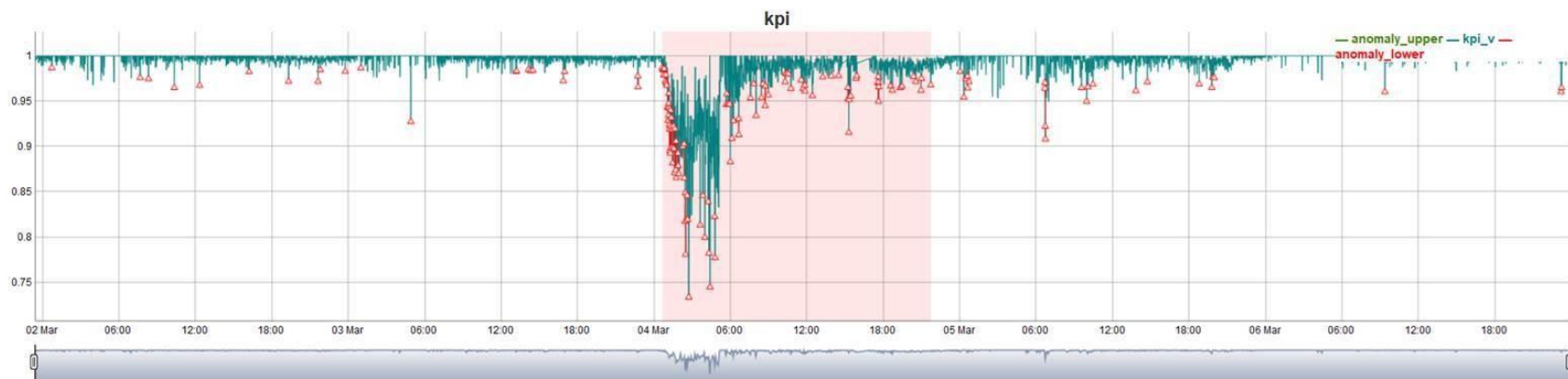
# IRC AIOPS Progress and Challenges

## Multi-KPI anomaly detection – Engineered features



# IRC AIOps Progress and Challenges

Single variate anomaly detection:  
point-anomalies clustering



# Thanks !

## Q&A?

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