Security Level:

AlOps

Huawei IRC Ops Team

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Huawei Mobile Service Introduction

Huawei users concentrating on efficiency & fun, quality & fashion

08:00 Check the news with Huawei Assistant. Select a new theme and start a new day.

12:00
Find a nearby restaurant.
Play an online match with your friends.

Start your leisure time after work. Food and entertainment all at your fingertips. 23:00
Listen to your nightly storyteller.
Your phone becomes your private theater.















09:00

Green your commute with Huawei Pay.

Put on your headphones and listen to your jams.

14:00

Read a book in the afternoon. Relax your mind with a short video.

18:00

20:00

Make your life more fun with quality apps. Let your music drift you into the night. 02:00

Securely backup data. Sleep with a peace of mind.

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

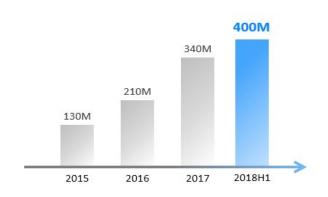
70%

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





AIOPS

AIOps Overview



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 Deep Learning Virtual Assistants Machine Learning Prescriptive Analytics. **Graph Analytics** Autonomous Vehicles Smart Robots Intelligent Apps Level 3 Vehicle Cognitive Computing Autonomy Computer Vision Deep Neural Level 4 Vehicle Autonomy Network ASICs Commercial UAVs (Drones) Digital Ethics Predictive Analytics Conversational FPGA Accelerator User Interfaces Cognitive Expert Advisors Bots Speech Recognition Learning BPO Natural-Language Neuromorphic & Consumer Smart Appliances Generation -Hardware Virtual Customer Assistants Ensemble Learning Deep Reinforcement Learning Artificial Virtual Reality Augmented Artificial Intelligence Reality GPU Accelerator for IT Operations Intelligence (AIOps) Platforms Knowledge Management Tools AI-Related Algorithm Marketplaces Services Human-in-the-Loop Crowdsourcing As of July 2017 Peak of Innovation Trough of Slope of Plateau of Inflated Trigger Disillusionment Enlightenment Productivity Expectations Plateau will be reached O less than 2 years 2 to 5 years 5 to 10 years A more than 10 years before plateau

Big Data

Alops

Machine
Learning

Ambition:

Source: Gartner

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



IRC AIOps Research Areas



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 AlOps

- 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





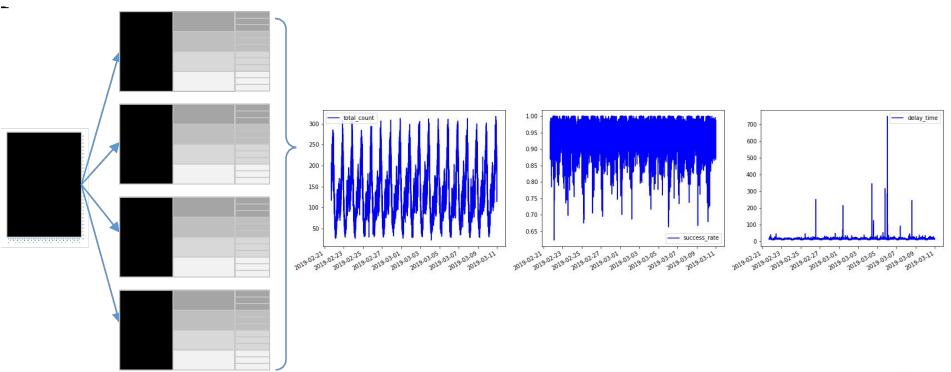
Al Techniques

- 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





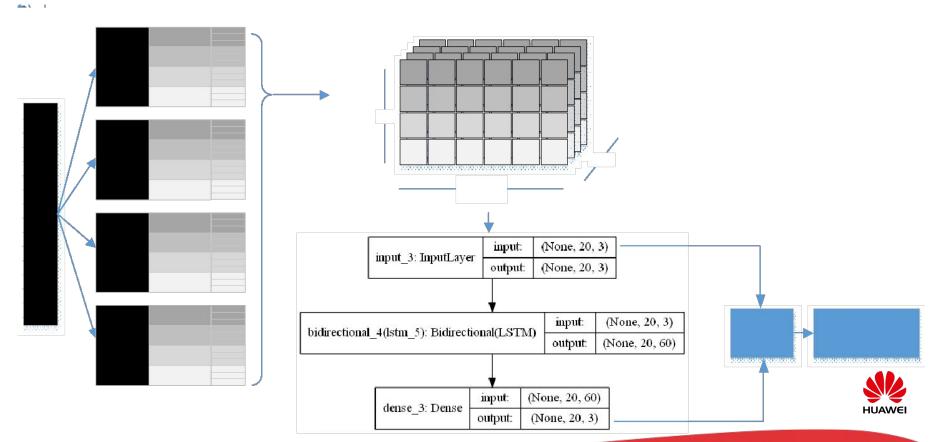
Problem and System Description



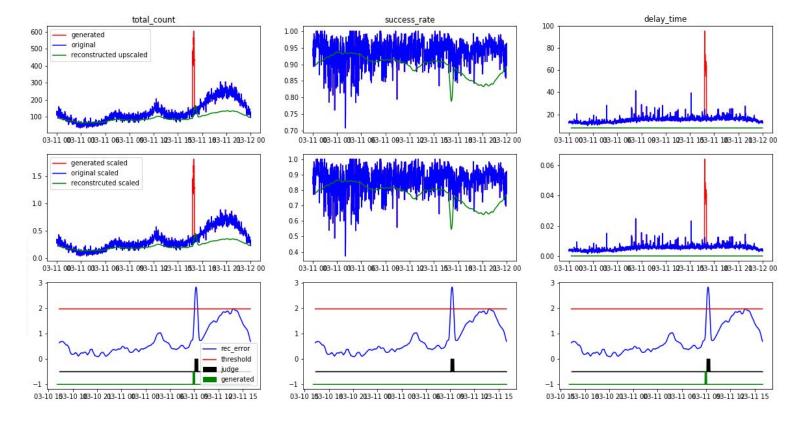




Multi-KPI anomaly detection – LSTM Bi-directional Autoencoder

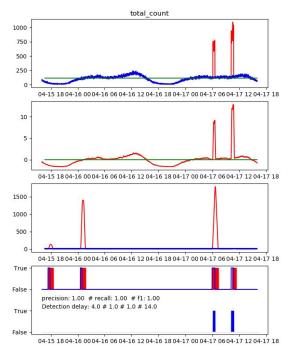


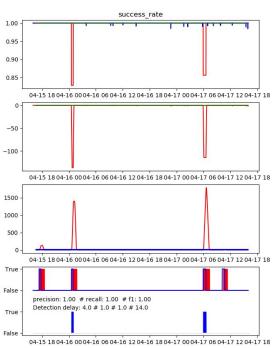


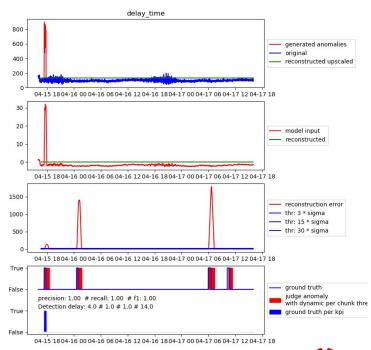




Multi-KPI anomaly detection – Engineered features





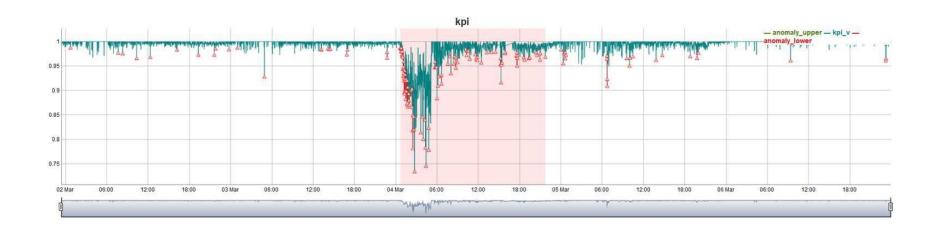






Single variate anomaly detection:

point-anomalies clustering







Thanks!

Q&A?

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