AliMe Bot Platform
- Alibaba’s Personal Intelligent Assistant

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Outline

- AliMe Bot Platform Introduction
- Intelligent Interaction Technical Practice
- Look Forward to The Future
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- AliMe Bot Platform Introduction
- Intelligent Interaction Technical Practice
- Look Forward to The Future
- Upgrading of service: From manpower to intelligence plus manpower
- Upgrading of field: From Ali inside to merchants and enterprises
AliMe Bot Platform Introduction

AliMe bot platform is a complete set of intelligent human-computer interaction solution.

- Face to three domains solutions:
  - **AliMe Assistant**: Platform solution for Alibaba business
  - **TiMi**: Platform solution for Merchants of Taobao
  - **Bee Bot**: Platform solution for enterprises, ISV etc.

- Supporting two types of infrastructures:
  - **SaaS**: Front to end solution, a whole chatbot system including chat UI
  - **PaaS**: Supply AI interfaces capability for developers to help build their systems
AliMe Bot Platform Introduction

Configuration Platform
Chatbot QA Platform
Smart Knowledge Base
Bot Framework
AI Boost
Chatbot Application Platform
Algorithm Component Platform
Data Platform

AliMe Assistant Platform
Different Domains of AliMe Assistants
Super AliMe Assistant

Alibaba
SaaS
Taobao
Tmall
Wang Xiang
Travel
Second-hand
Other

SaaS
Travel

PaaS
B2B
Logistics
Youku
Other

SaaS
Qianni Platform

SaaS or PaaS
DingTalk
AliCloud
Oversea
IOT

Enterprise

Merchant

TiMi
Bee Bot Platform
AliMe Assistant

- **Covered Areas:**
  - Customer Service
  - Shopping Guide
  - General Assistant Application
  - Chit Chat
  - Activity Operation
  - ……
AliMe Bot Platform Introduction

TiMi

- **Features:**
  - General ontology model for all categories: logistics field
  - Industry ontology model: mobile phone, clothing etc.
  - General QA model
Bee Bot Platform

- **Features:**
  - This is a whole solution for 3rd party, i.e. enterprise, ISV etc.
  - Smart knowledge base to fulfill knowledges
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AliMe Bot Platform Application Architecture

- AliMe Assistant
- TiMi
- Bee Bot Platform

PaaS Service Layer

Dialog Management System

Matching Model
Bot Framework

Algorithm Component Platform

Configuration Platform
Knowledge Base
AI Boost
Intelligent Interaction Technical Practice

AliMe Bot Platform Algorithm Model Architecture

Intent Routing

Routing Layer
- Customer Service
- Shopping Guide
- Logistics Field
- Chit Chat
- others

Service Layer
- Muti-turn Interaction
- Muti-model Interaction
- Recommendation
- User Profile
- Semantic Recognition
- ASR
- Image Recognition

Model Layer
- Knowledge (QA pairs, Ontology, Knowledge Graph)

Data Layer
- ML/DL Training
- Data Mining
- Data Analytics
Intelligent Interaction Technical Practice

Query+Context

Intention Recognition

Dialog Management System

QA Bot
Task Bot
Chat Bot

Knowledge Graph
IR
Slot Filling
Bot Framework
DRL
IR+LSTM
Intelligent Interaction Technical Practice

Intention Identification Process

Query → Segmentation, POS Tagging, NER → Intention Classification → Context Model

Dialog Management → Semantic Representation → Intention Attribute Extraction → Domain Model
Intention Identification Classification

- Traditional machine Learning methods:
  - Supervised multiply classification
  - Supervised multiply binary classification
  - E.g. Bayes, KNN, SVM, Logistic Regression etc.

- Deep Learning:
  - Combined user profile or behavior to build deep learning prediction model
  - E.g. CNN, DNN, LSTM etc.
Enrich Question with Profile, Behavior and Context
Intention Identification with Deep Learning

Multiple Classification (DNN 2-channel inputs)
- Behavior, Profile, Context
- Question (BOW/RNN/CNN)
- Embedding
- Softmax
- All labels

Multiple Binary Classification (DNN 2-channel inputs)
- Behavior, Profile, Context
- Question (BOW/RNN/CNN)
- Embedding
- Logistic Regression (LR)
- L1
- L2
- L3
- …
Intelligent Interaction Technical Practice

Intent decision & feature generation

- Intent relation
- Intent rule
- Intention model
- Sen representation
- Topic model
- Similarity model
- S2S model

Algorithm component

- graph
- aiml
- Clas
- SM
- LDA
- s2vec
- RNN

BotFramework

- Maxent
- CNN
- skip-thoughts
- Lda2vec
- Cosine
- WMD
- SentenceRNN
- ContextRNN

Data

- Domain1: book airline tickets
- Domain2: weather report
- Domain2: top up
An Excerpt of a Knowledge Graph

**Pros**

- Supports Contextual Reasoning
- Minimized maintaining costs for knowledge items
- Improved accuracy (10%+) and user experience

**Cons**

- Loss of recall at initial stage
Intelligent Interaction Technical Practice - QA Bot

Retrieval Model

Preprocessing
1. Anaphora resolution
2. Word segmentation
3. Error correction

Recall
1. Open search

Structured Knowledge
1. Inverted Indexing

Indexing
1. Inverted Indexing

Computation
1. Similarity
2. Sentiment analysis
3. Attribute identification

Term Weighting

Answer Processing
1. Answer rendering
2. Logging

Answer
Task-Oriented QA

Input: Extract the slots of query
Output: DMS feedbacks the result

Processes:
• Get the attributes of the intent tree to fill
• Check the state of the intent tree
• Get the result by the state
Features:

- Custom chat flow
- Custom entities and slot values
- Support the 3rd party interfaces to be invoked with specific protocol
RL for task-bot

Related-work from MSR

References
DRL for task-bot

- Related work: From Cambridge

References
Hybrid Approach: Retrieval Model + Generation

- Retrieval Model and Generation Model:
  - Retrieval Model: More platform, but only output answers in a pre-established knowledge base.
  - Generation Model: Generate answers out of the box, but the generated answers sometimes can be inconsistent or meaningless.

Basic ideas:
- Hybrid Approach: IR Rerank + Generation
Seq2Seq Rerank Module

- Answer reranking

- Score functions
  - Q for encoder, A for decoder
  - Cross-ent, Averaged prob. > Geometric average
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Model construction in different domains and scenes

The accumulation of domain data and knowledge is very important

The direction of continuous exploration in the field of Technology: generative model, reinforcement learning, transfer learning, machine reading, emotion and so on

Construction and application of small data model
Thank You!
Intelligent Interaction Technical Practice - QA Bot
Experiment

Accuracy at different confidence scores

- 500 queries, each has 10 answers (IR results)
- each query has a confidence score
- 10 bins, bin #1 with highest confidence scores
Hybrid Approach: IR Rerank + Generation

IR + Rerank + Generation (T = 0.21)