

苏宁智能机器人平台设计
与应用实践

李伟

苏宁云商IT总部技术总监



WOTD

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[深圳站]

报名咨询：010-68478816

议题提交：wot@51cto.com

市场合作：yangxh@51cto.com

商务合作：songjc@51cto.com

媒体合作：yankk@51cto.com

在线咨询（微信）：18401576051

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Conversational Commerce Suning Bot Platform

Suning Research AI Lab

Wei Li

Agenda

- Overview of Dialogue System
- Search-based Question Answering
- Slot Filling-based Intent Understanding
- Regression-based Smart Customer Service
- AI + HI Architecture
- Suning Bot Platform
- Demo

Information Retrieval Trend

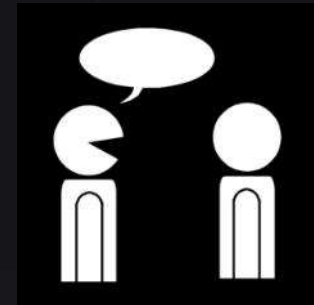
Library Search, 1970



Web Search, 1990



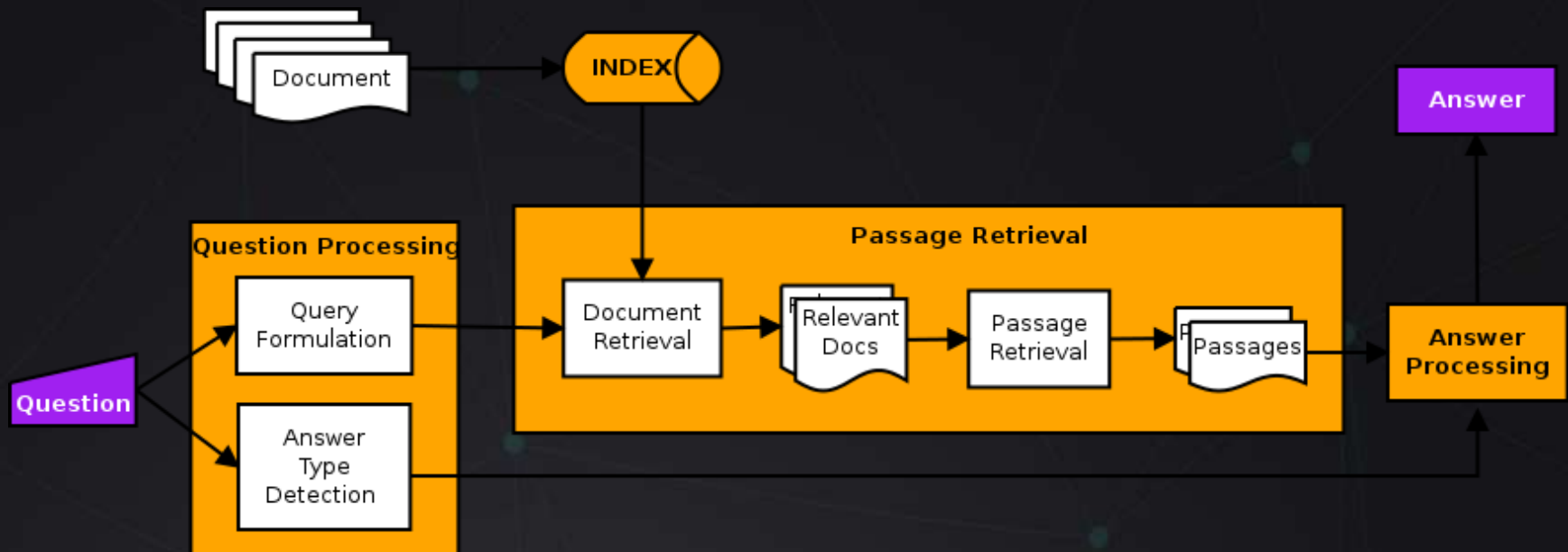
Dialogue System, 2015



Question Answering Overview

- Definition
 - Automatically answer a user's question by machine
- Types of QA
 - Types of questions
 - Factoid, who is the wife of Obama
 - Opinion, what is your point to air pollution
 - Yes-no, are you happy?
 - Comparison, what are the differences between mac and windows?
 - Types of content
 - Textual QA
 - Visual QA
- Key technology behind Dialogue System

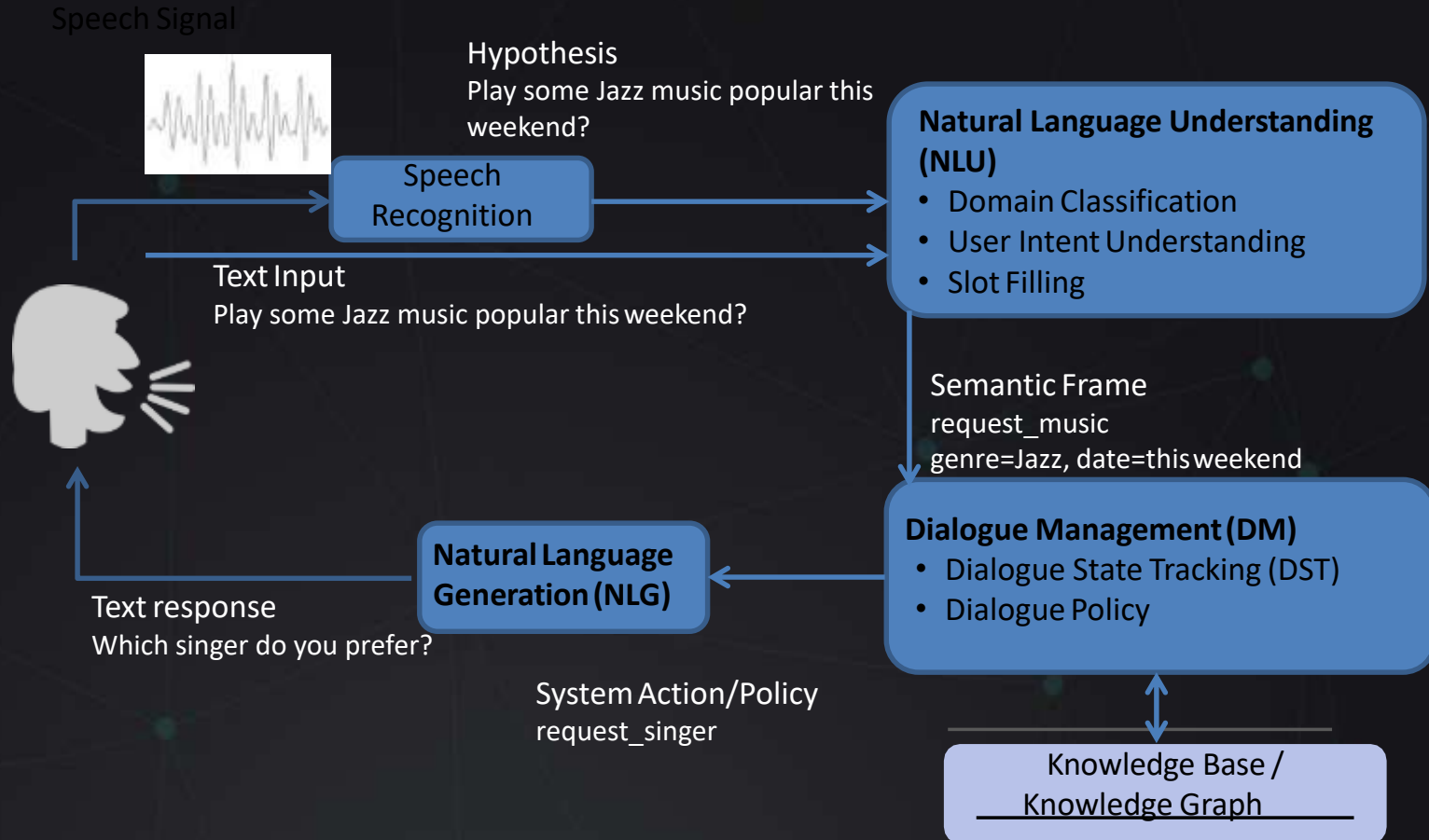
QA Architecture



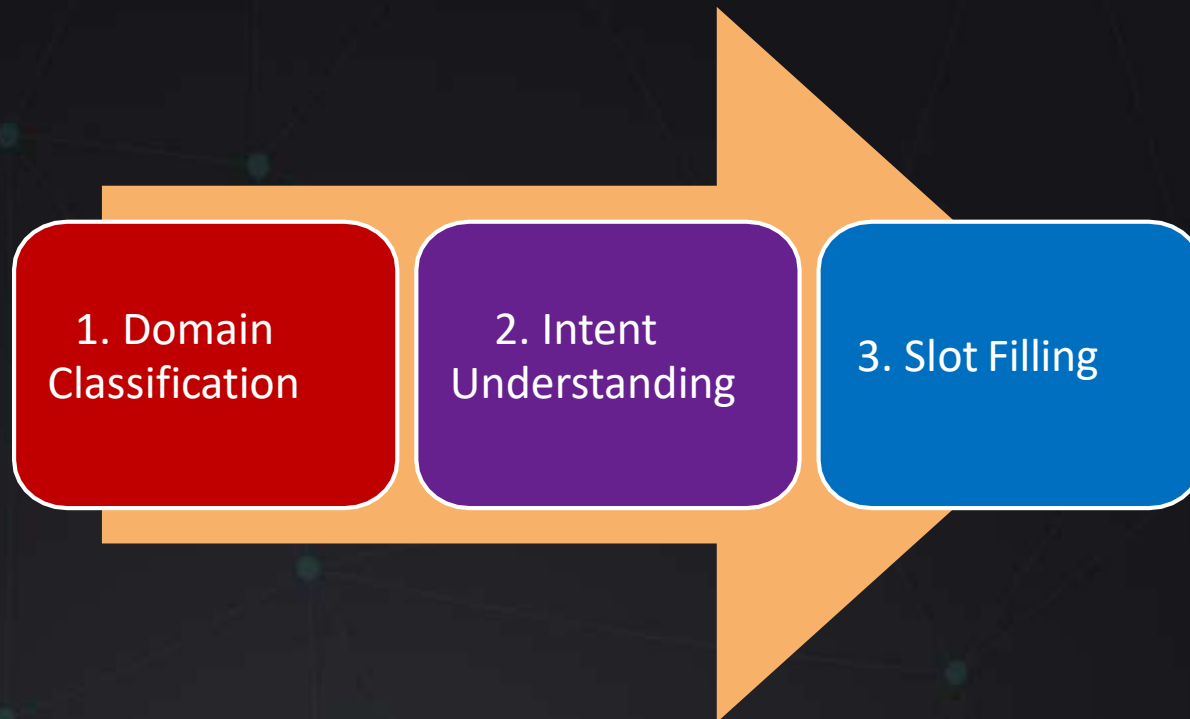
Dialogue System Type

- Chat Bot
 - Free chat on specific or open domain topics
 - Xiaolce, Microsoft
 - Duer, Baidu
- Task Bot
 - Task completion on vertical domains
 - Cortana, Microsoft
 - Siri, Apple

Task Bot Architecture



Natural Language Understanding

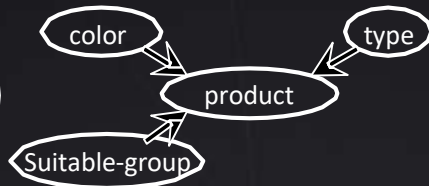


Semantic Frame Model

- Requires a domain ontology
- Contains **core content (intent, a set of slots with fillers)**

Product Domain

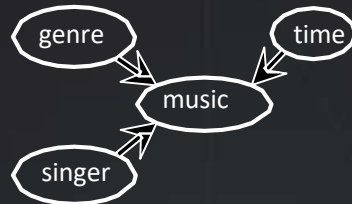
I would like to buy a red, Apple phone suitable for boys



buy_product (type = "Apple", color = "red", suitable-group = "boys")

Music Domain

Play some Jazz music by James this month



find_music (genre = "jazz", singer = "James", time = "this month")

Domain Classification

User



find me a red mobile phone suitable for girls

Classification!

Product DB

Music DB

Weather DB

Smart
Assistant

Domain Knowledge Base

Intent Understanding

User



find me a red mobile phone suitable for girls

Classification

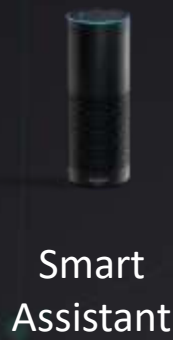
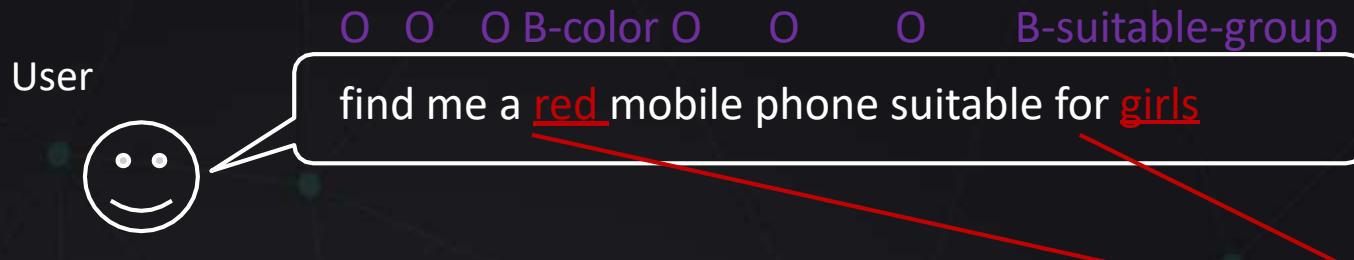


Smart
Assistant



BUY_Mobile_Phone
BUY_CLOTHES
BUY_BOTTLED_WATER
:

Slot Filling



Product	Color	Suitable-group
mobile phone 1	red	girl
mobile phone 2	blue	boy
:	:	:

BUY_MOBILE_PHONE
 color="red"
 suitable-group="girl"

Semantic Frame

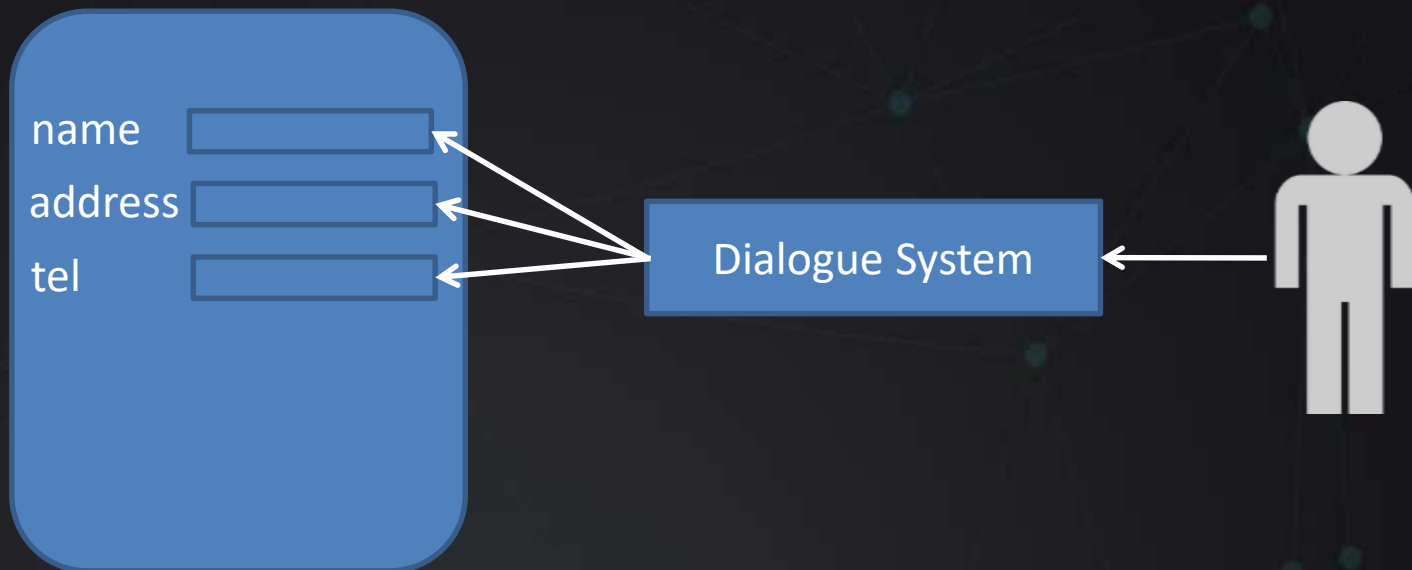


Search mobile phone {
 mp.color = "red"
 mp.suitable-group="girl"

Sequence Labeling

Slot Filling

- Definition
 - Fill the missing information or attributes about a given entity or task, (entity/task, slot, filler)



Slot-filling Application Scenarios

- Dialogue System
 - Filling slots via single-turn, multi-turn interaction
- Product attributes refinement
 - Correcting or filling missing attributes based on the information of aligned products
- Entity profile completion
 - Complete entity properties from web text mining

Slot Filling Approaches

- Pattern-based methods
 - Fixed response template set
 - Example: I [love/like] [NER]'s song
- Classifier/model-based methods
 - Formulated as sequence labeling task
 - Example: buy me a ticket from Beijing to Shanghai tomorrow morning

Slot Filling Examples

Is there a cheap restaurant in the center of town please?

Sequence Labeling Task

CRF for tagging each utterance

Classification Task

Regression for each slot value pair

Is there a cheap place in the centre of town please?



slot value pairs

(price, cheap)	✓
(price, center)	✗
(price, town)	✗
(area, center)	✓
(area, cheap)	✗

⋮

Smart Home Control

- Smart Home Appliance Control
 - Some metrics

指标	数值
#Home Appliance	15
QPS	3ms
Precision	>84%
Recall	>88%

Suning Smart Control Demo

苏宁智能机器人平台，技术研究院人工智能实验室

服务体验

测试

JSON表格

device_type	AC	
tts	设置空调温度为20摄氏度	
cmd	SET_TEMPERATURE	
cmd_args	arg_name1	temperature
	arg_value1	20

Smart Customer Service

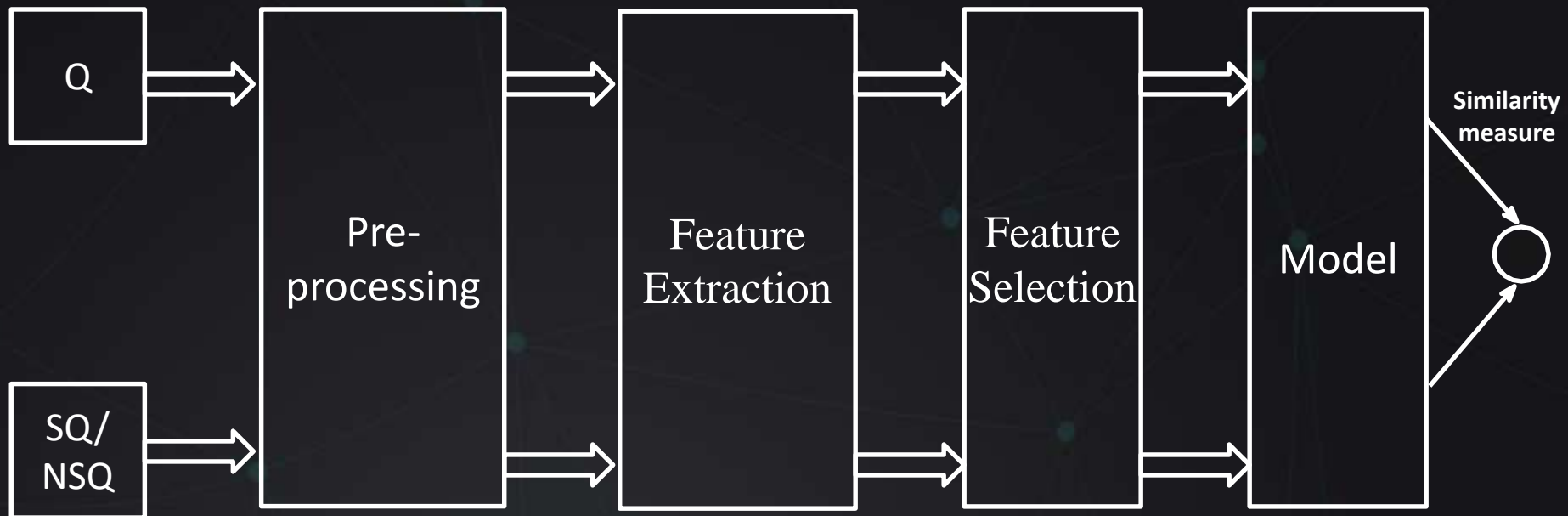
- Smart Customer Service
 - Definition
 - Bot assistant customer service, to help human customer service to satisfy users
 - Scenarios
 - Bot first
 - Bot assistant
 - Queue
 - Offline

Regression-based Smart Customer Service

- Problem formulation
 - Data: (Q, SQ, A, Tag)
 - Example:
 - (差旅费有哪些内容, 差旅费有哪些, A, Tag)
 - (差旅费有哪些内容, 差旅费有些啥, A, Tag)
 - (差旅费有哪些内容, 哪些项目是差旅费的, A, Tag)
 - Model
 - Binary regression model

Regression-based Smart Customer Service

- Architecture



Smart Customer Service Demo

- Smart Financial Customer Service

小苏-智能机器人 服务号 

李伟  差旅费有哪些内容

李伟  差旅费有哪些

李伟  差旅费是指前往异地，开展公务活动所产生的相关费用，主要包含交通费、住宿费、出差综合补贴、其他费用。

- 1、交通费：出发地至目的地之间以及出差过程中至远郊区、县发生的长途交通费。
- 2、住宿费：出差期间发生的住宿费用。
- 3、综合补贴：包括在出差期间因公产生的市内交通费、餐费等。
- 4、其他费用：包括出差乘坐各类交通工具所产生的强制性保险、订票手续费、签证费、托运费、订票、过路费、飞机改签费、签证费等。

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Smart Customer Service

- Suning Internal Smart Customer Service
 - Some metrics

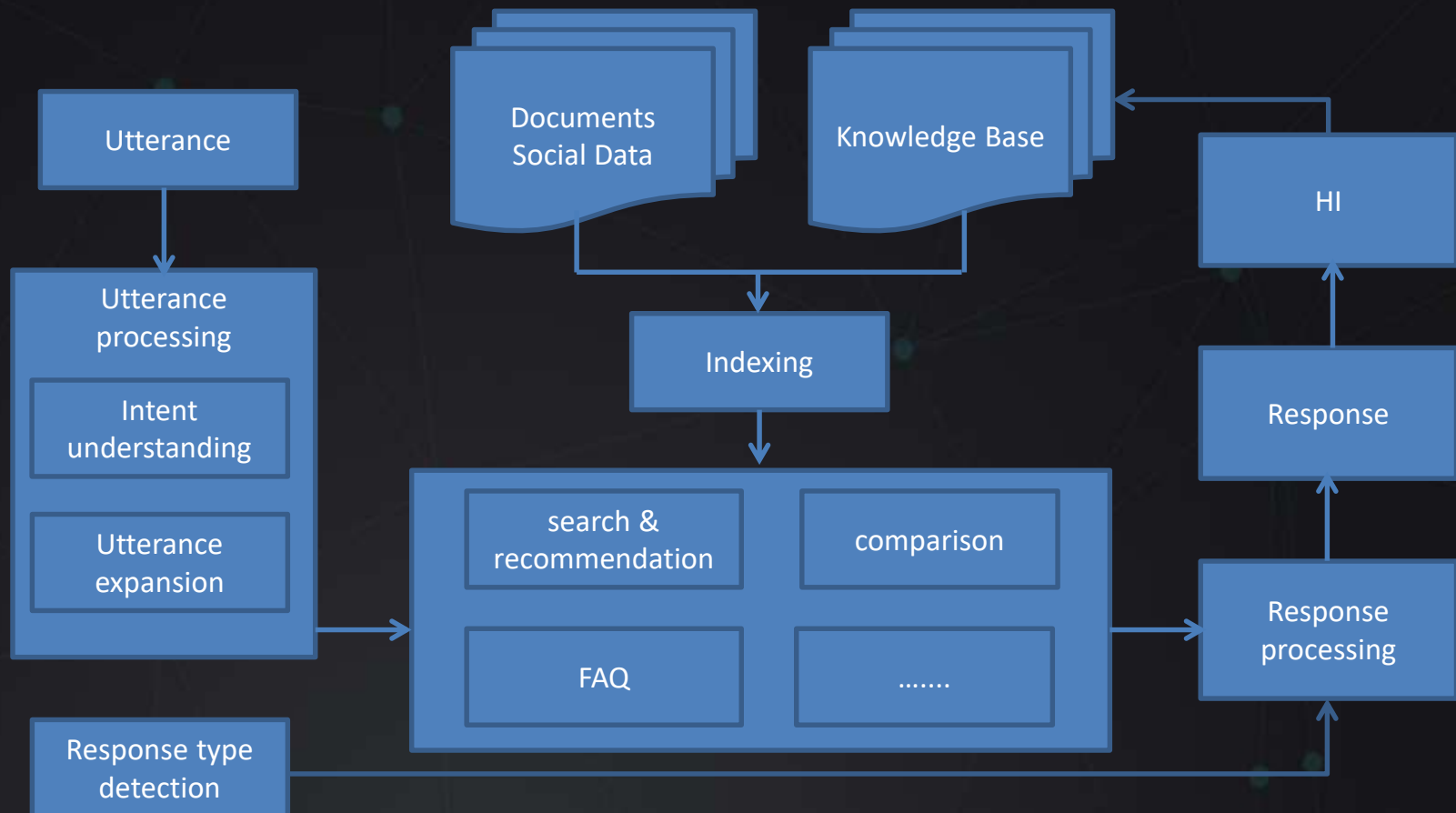
指标	数值
Types	IT, Finance, HR
QPS	3ms
Precision	>64%
Recall	>72%

Suning Chat Bot Demo



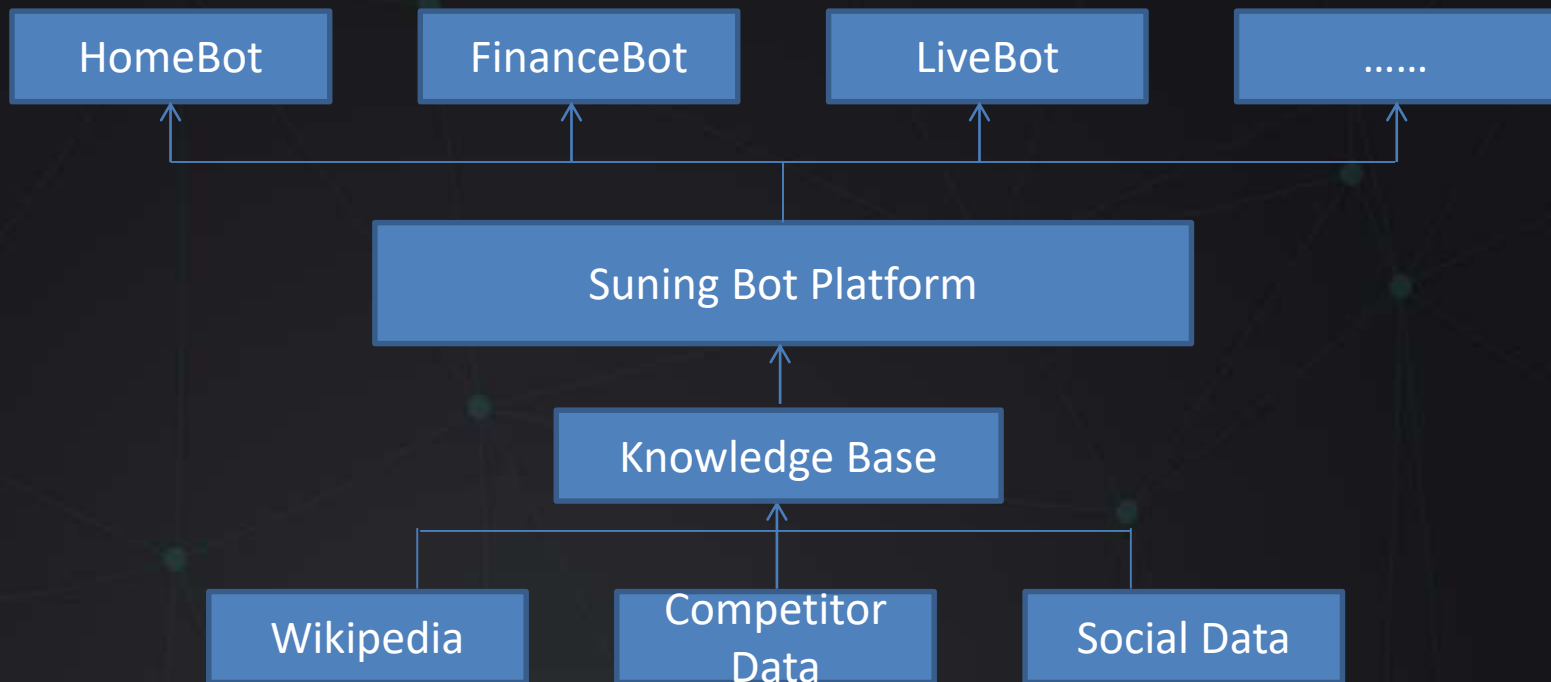
AI + HI = MI

- MI Architecture

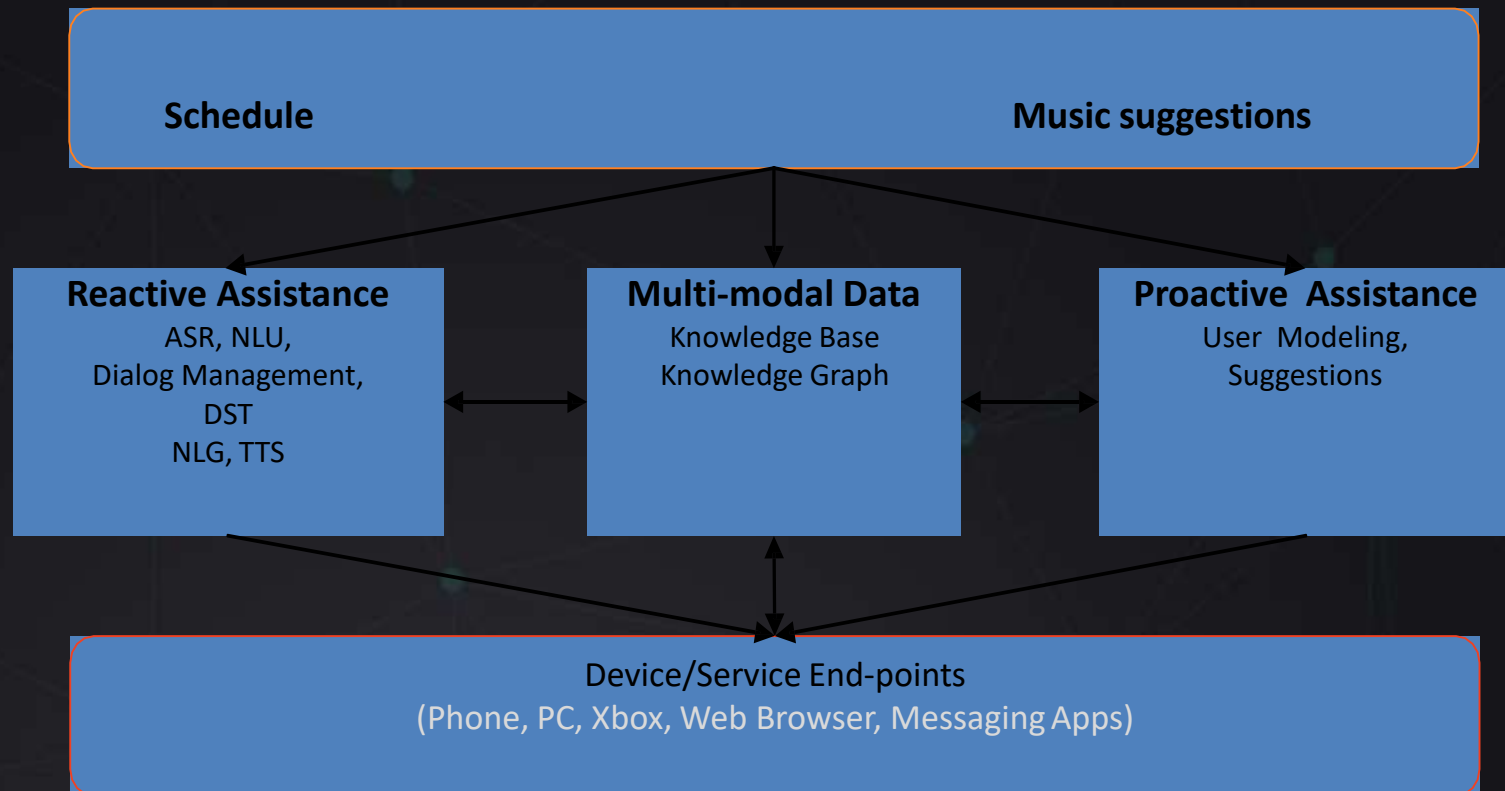


Suning Bot Platform

- Architecture



Smart Assistant Architecture





THANK YOU

