



On The Design and Development of A Mobile Virtual Assistant for Vietnamese (VAV)

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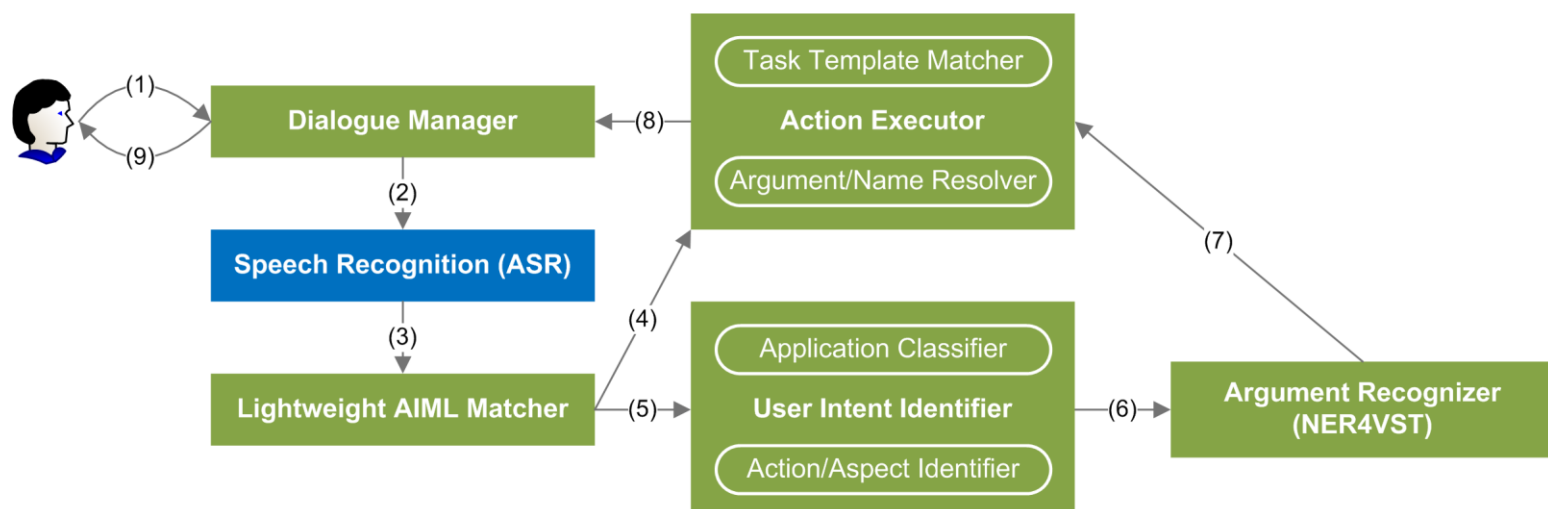
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Introduction

Virtual assistants on mobile devices have recently caught increasing attention of researchers. The convenience of these applications and the growth of mobile device usage bring promising opportunities to invest in this field. The application named VAV is a virtual assistant on mobile devices for Vietnamese on Android platform. VAV helps users to perform hand-free tasks and quickly access information on their devices. What makes VAV differ from similar application is its ability to get users' intents no matter how they make their requests, without predefined templates, although Vietnamese sentences can be expressed variously. To the best of our knowledge, this is the first spoken dialogue application on mobile devices for Vietnamese supporting smart language analysis and understanding. The project is developed by the research group in DS – KT Lab at University of Engineering and Technology, VNU.

Methods

Design and Architecture of VAV



Vietnamese Spoken Text Understanding

Vietnamese spoken language command	Intent (a::f)
ngã tư tây sơn chùa bộc ở đâu (where is tay son chua boc intersection)	map::locate
gọi số 0903206714 (call number 0903206714)	phone::call

Application Classification

Label: sms, call, browser, calendar, contact, otherdapp,...

Use Maximum Entropy with feature templates: n-gram, dictionary, regular expression, conjunction matching.

Action Identification with Conjunction Matching

Example: “calendar, set, 1-^đặt+lich” →

$$r_1 = (\text{calendar, set, 1, true, false, (đặt lịch), } \{(đặt, 1), (lịch, 1)\})$$

Given an input command, the matching algorithm selects the matched conjunction with the highest priority for the command.

Command Argument Recognition

NE types: location, datetime, url, cnumber, aname, email, number

Example: “thời tiết vùng tàu ngày kia”

→ Two named entities: $E_x = \{e_1(\text{location}, 3, 4), e_2(\text{datetime}, 5, 6)\}$

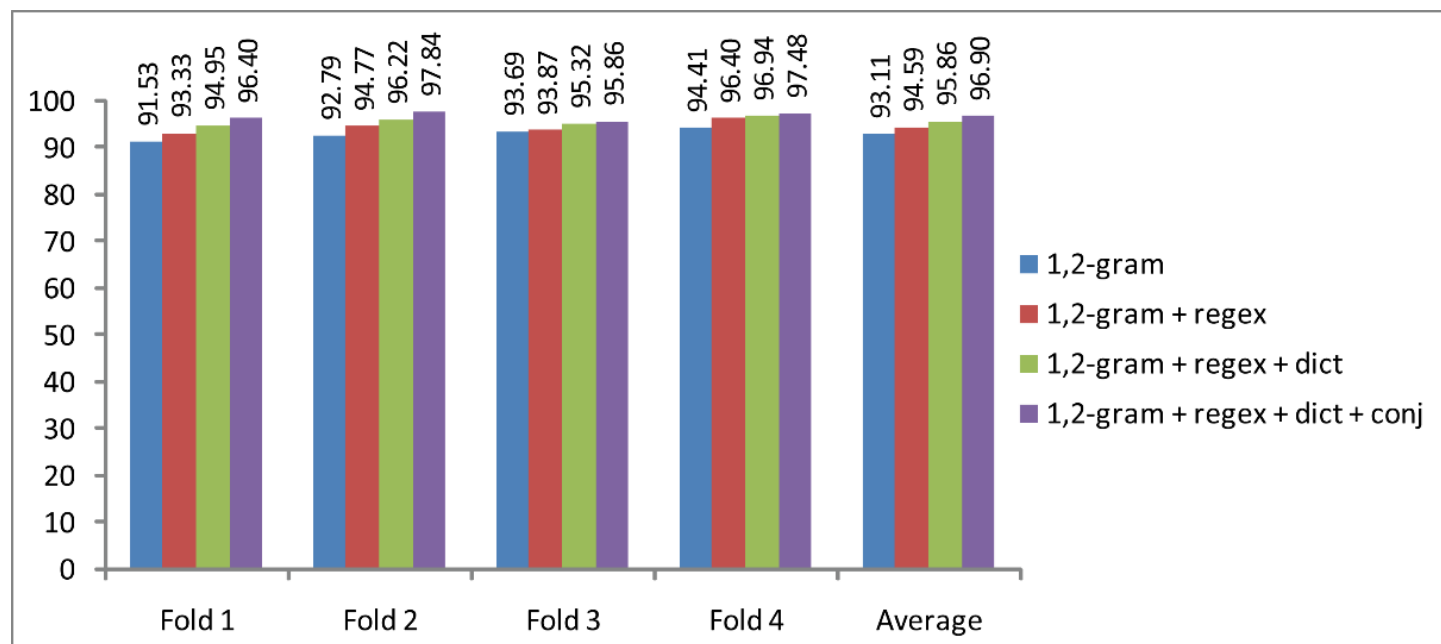
Use Maximum Entropy with feature templates: n-gram, dictionary, regular expression.

AIML

An XML-based description language to create natural language software agents.

Result

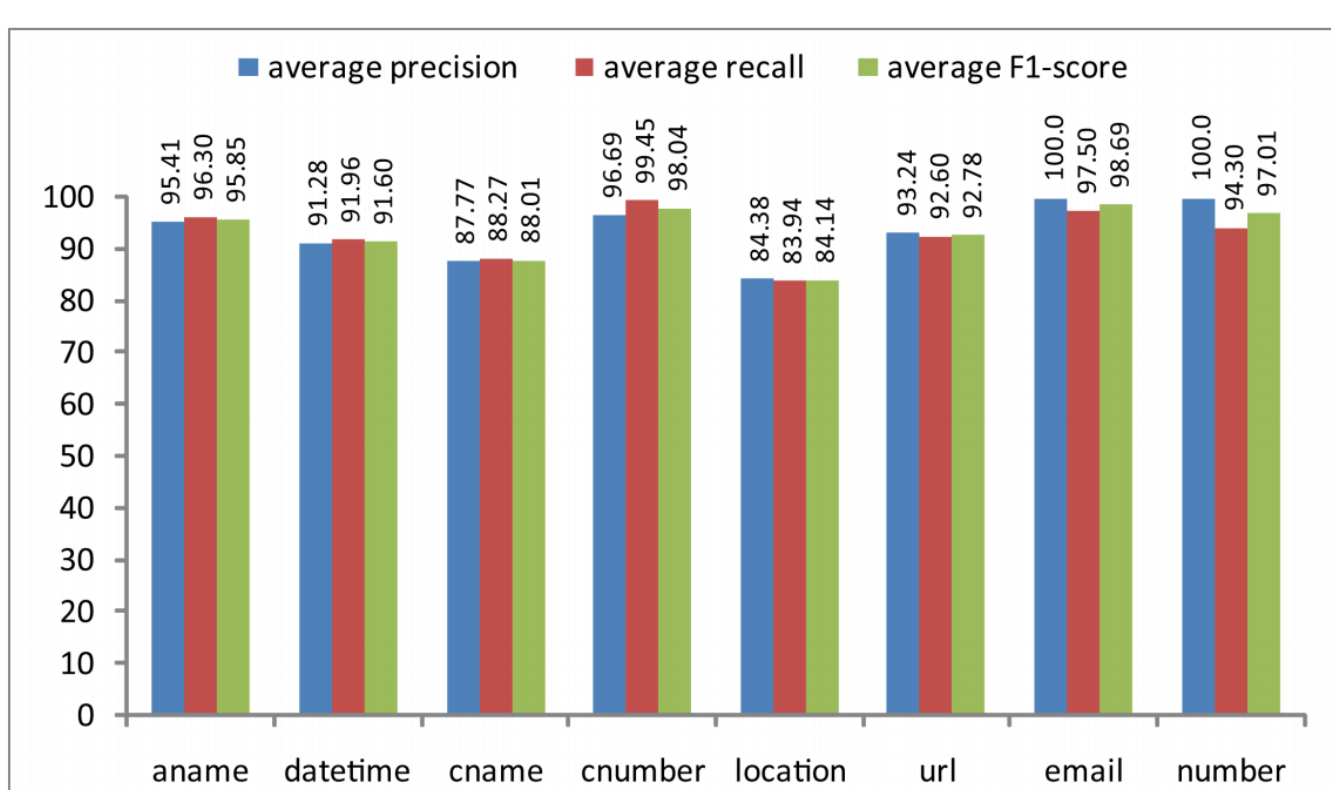
Application Classification



Action Identification with Conjunction Matching

Application	Action	Accuracy	Application	Action	Accuracy
alarm	turn-off	100.0	phone	call	100.0
	set	99.06		query	100.0
	delete	100.0		open	90.0
	open	96.78		reminder	turn-off
browser	open	88.27	set		100.0
	delete	100.0	delete		97.96
calendar	set	92.30	open		90.91
	query	84.91	send	96.15	
	delete	100.0	open	100.0	
camera	take-photo	98.77	weather	query	100.0
	record-video	100.0	web-search	query	72.97
contact	add	100.0	setting-wifi	turn-off	100.0
	query	96.00	setting	turn-on	100.0
	share	71.43	setting	open	100.0
email	open	100.0	setting-3g	turn-off	93.94
	query	75.00	setting-3g	turn-on	95.92
	send	100.0	setting-volume	turn-down	95.24
map	open	100.0	setting-volume	set	80.95
	find-direction	87.80	turn-up	95.56	
	locate	83.95	turn-off	100.0	
music	open	88.89	setting-orientation	turn-on	100.0
	open	100.0	turn-down	93.33	
note	add	97.56	setting-brightness	set	92.86
	open	96.67	turn-up	93.75	
other-app	open	94.74	setting-bluetooth	turn-off	100.0
	open	100.0	turn-on	100.0	

Command Argument Recognition

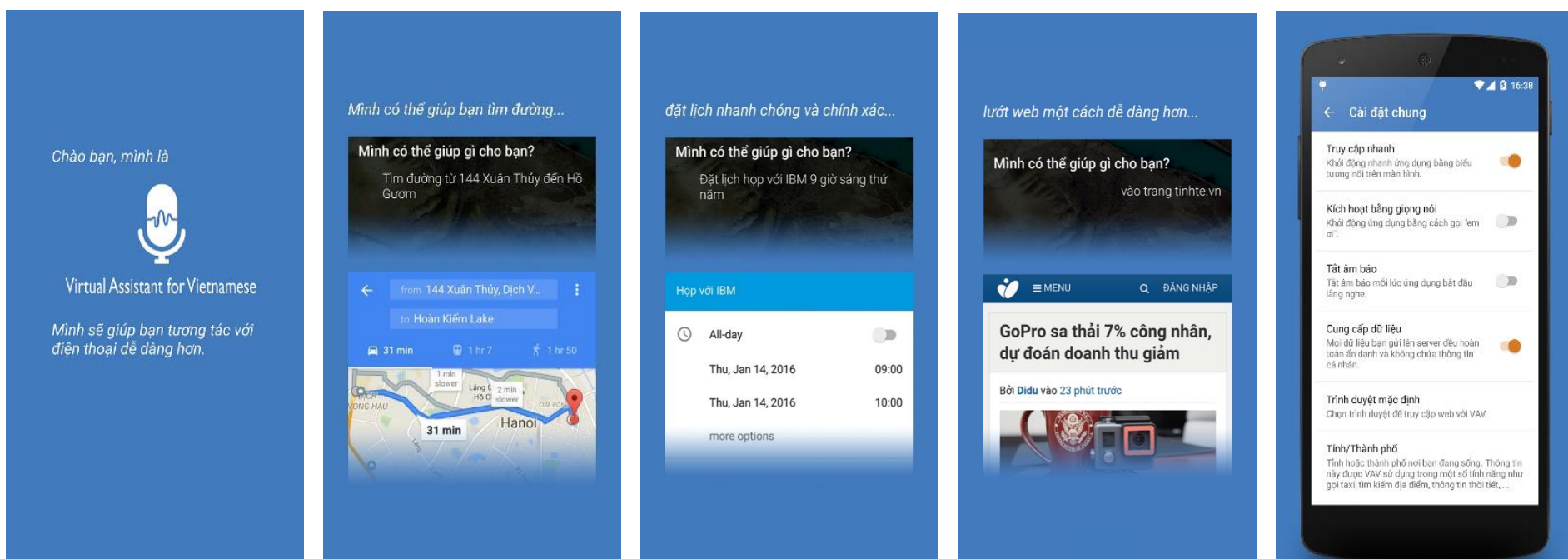


AIML

- Built approximately 1,000 AIML categories on our bot to help VAV smoothly communicate with users.
- A female bot, it was built from thousands of categories and about 30 sets and maps. It is very funny and smart girl.

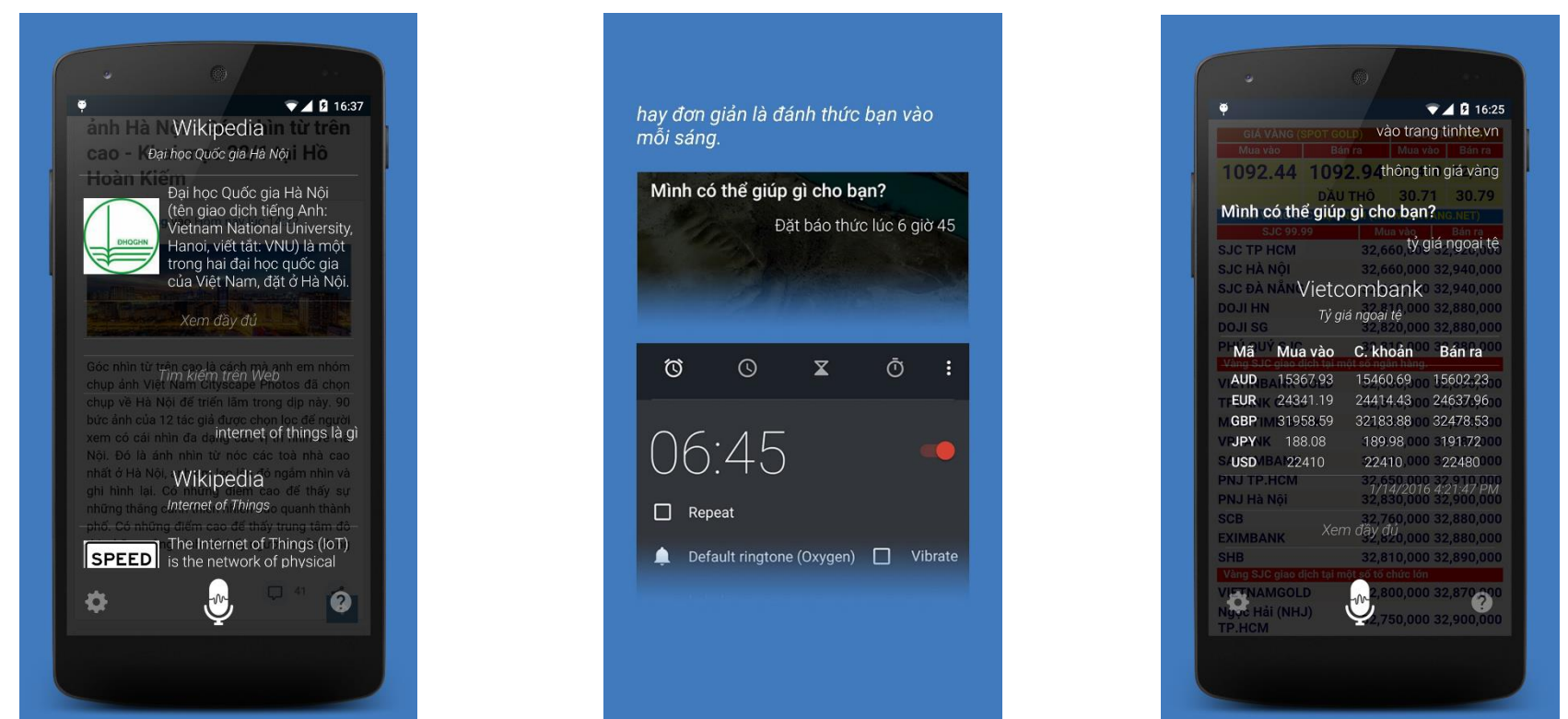
VAV

Virtual Assistant for Vietnamese

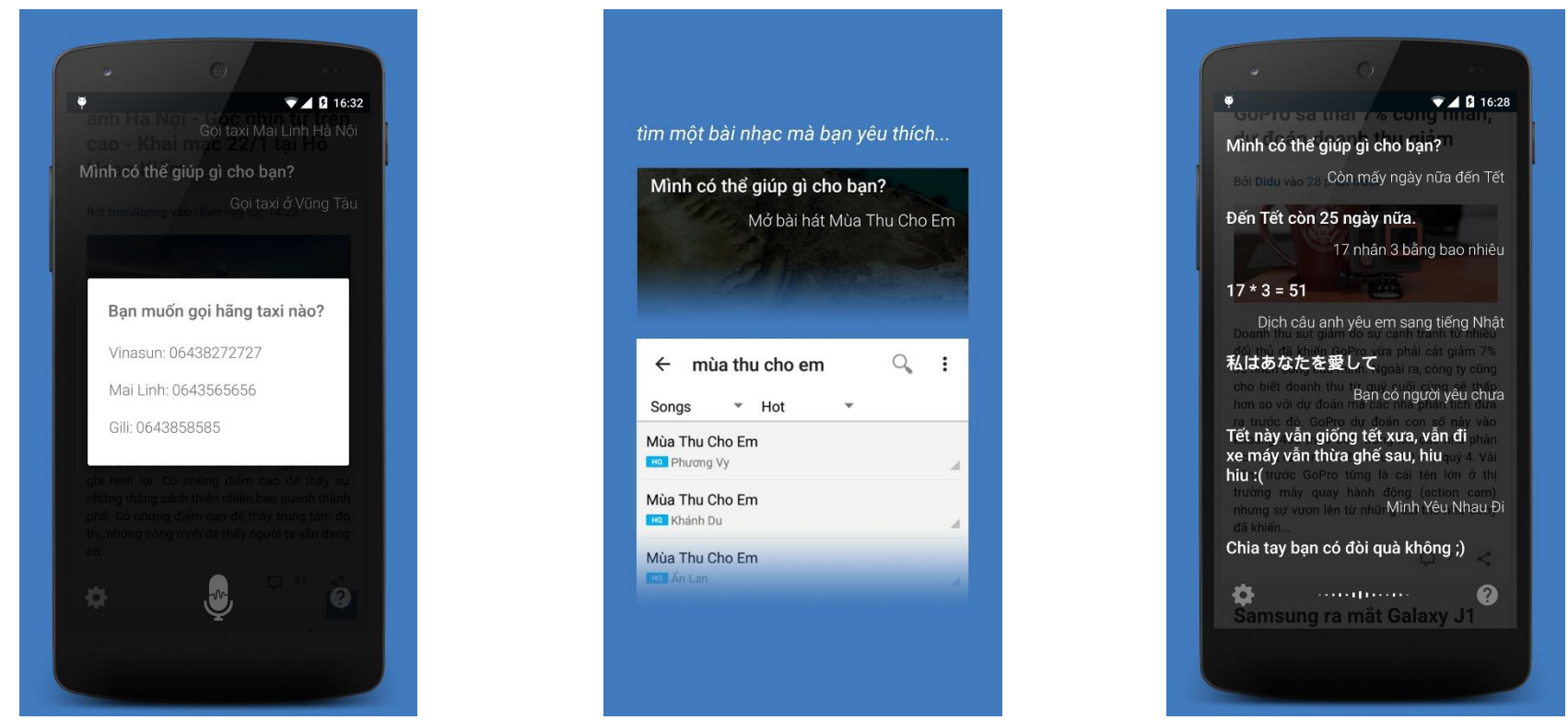


The tasks performed by VAV are listed as follows:

- Locate a specific position, find direction on map
- Surf the Internet
- Query weather forecast
- Set alarm and reminder
- Set up meeting schedule and query the lunar calendar
- Set up devices and change
- Settings
- Make phone call and send message
- Manage contact
- Open email box, check for email, and send email.
- Open applications installed on devices
- Browse Wikipedia
- Take photos, record videos, and open images in gallery
- Calculate basic mathematical operations
- Translate and look up words in the dictionary
- Check for lottery result
- Make basic conversation with users
- Play music



“ĐH Quốc gia Hà Nội” “Báo thức lúc 6 giờ 45 phút” “Tìm giá ngoại tệ”



“Gọi taxi” “Mở bài hát mùa thu cho em” Translate and basic conversation

Result

Publications: Two public papers in ACIIDS 2016

Released two versions of VAV on Google Play Store:

- Version 1: more than **80,000** downloads, **4.73/5.0** of **7,429** ratings in total.
- Version 2: more than **40,000** downloads, nearly **1,700** active users per day.

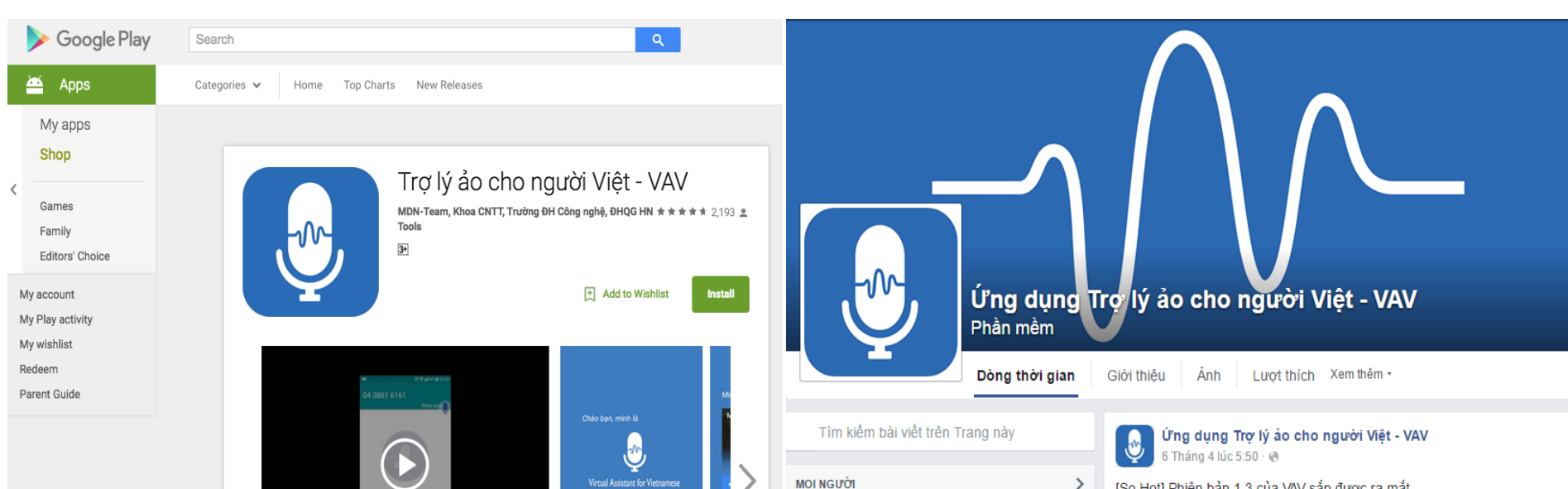
The result of earning reputation:

- Attracts media attention as well as technology community attention, e.g. tinhte.vn, dantri.com, VTV, VTC...
- Contribute to enhance the reputation of UET

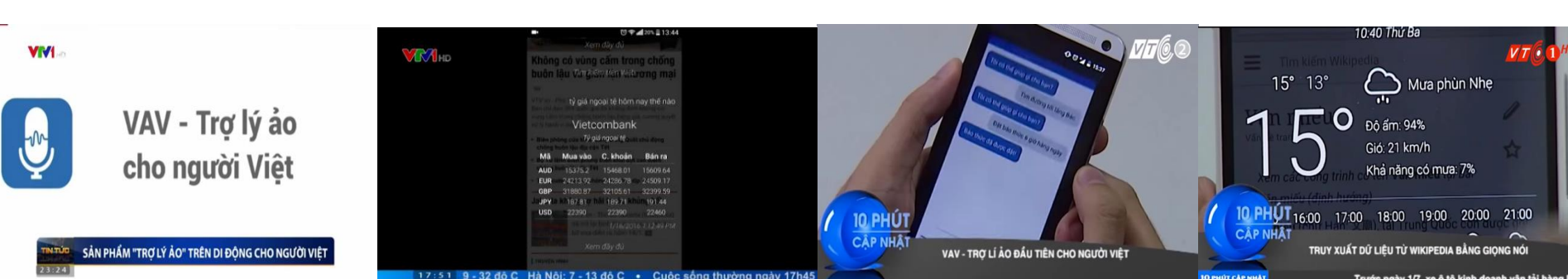
Future work:

- Make VAV become more natural and convenient
- Fix the compatibility bugs on Android devices
- Improve the accuracy of models
- Enrich features of VAV such as voice responses, movie information searching, sport information searching, etc.

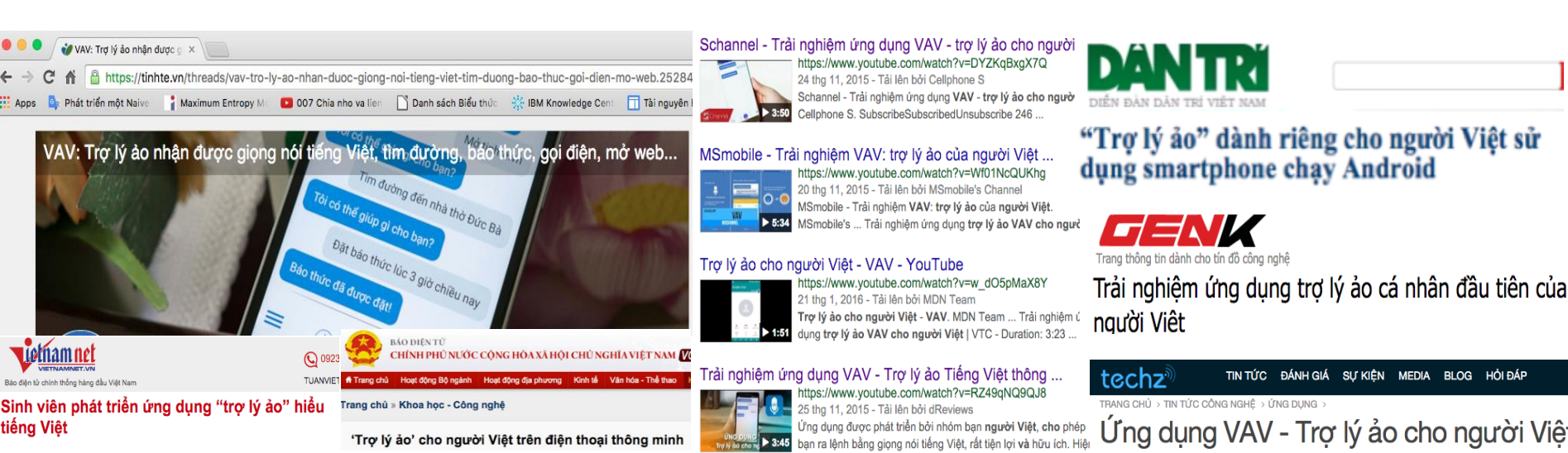
VAV on Play Store and Facebook



VAV on TV



VAV on Online Social Media



References

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- P.-N. Tran, V.-D. Ta, Q.-T. Truong, Q.-V. Duong, T.-T. Nguyen, and X.-H. Phan: *Named Entity Recognition for Vietnamese Spoken Texts and Its Application in Smart Mobile Voice Interaction*. In ACIIDS, 2016