



Yangtao - AR App for Interactively Learning and Exploring Chinese Characters

用于交互式学习汉字的增强现实应用程序

Team Introduction



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Motivation

Liberal education is a literate education of a certain kind. The greatest minds to whom we ought to listen are by no means exclusively the greatest minds of the West. It is merely an unfortunate necessity which prevents us from listening to the greatest minds of India and of China: we do not understand their languages.

--*What Is Liberal Education?* Leo Strauss



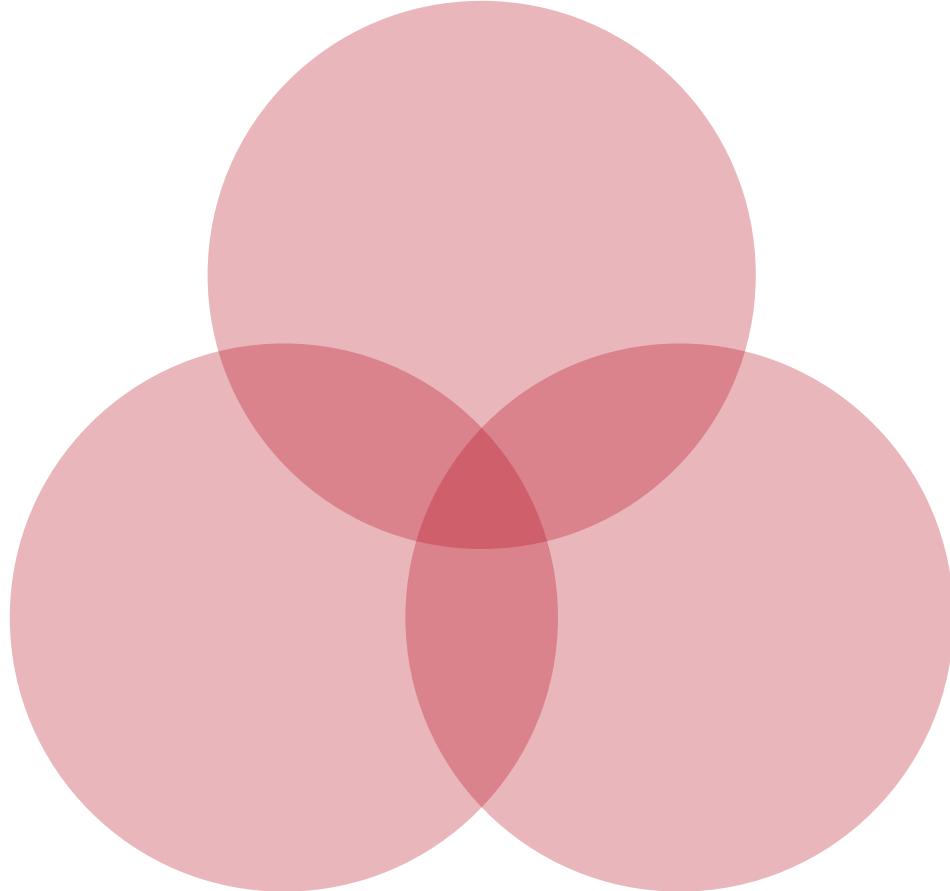
Motivation



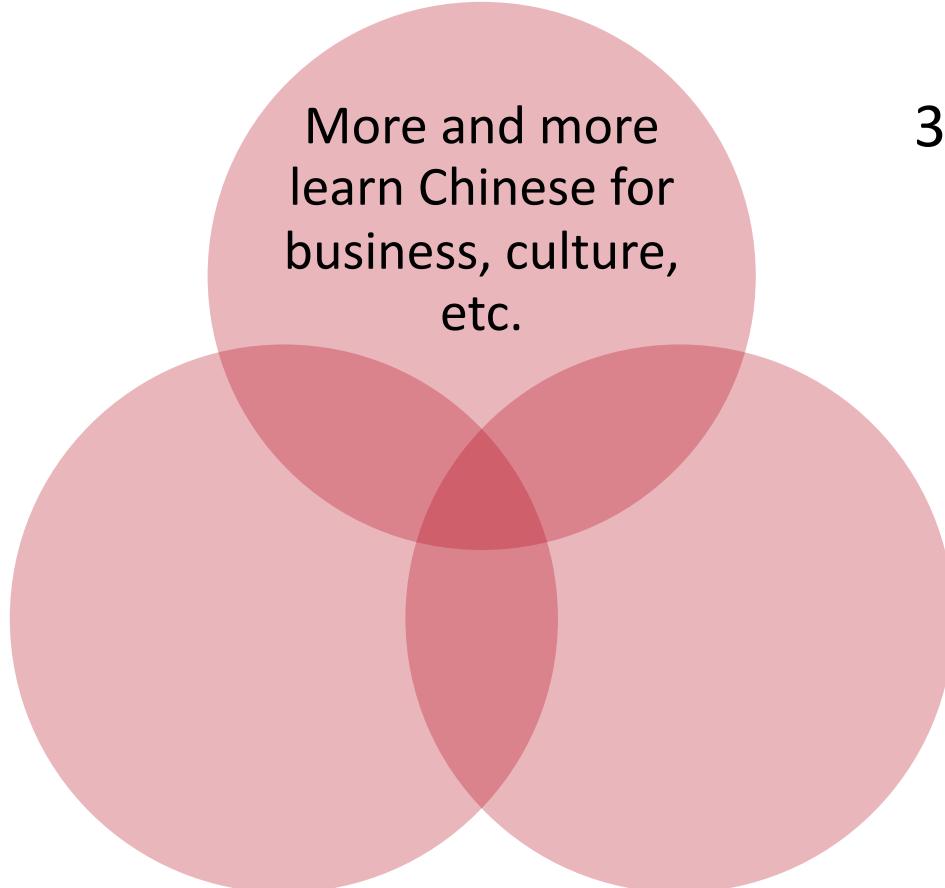
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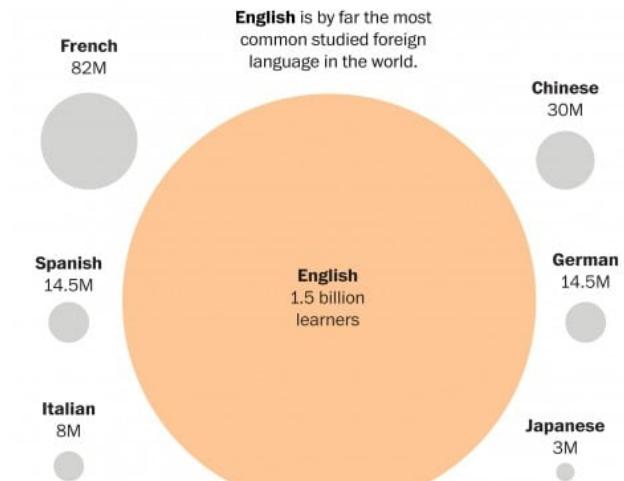
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Motivation



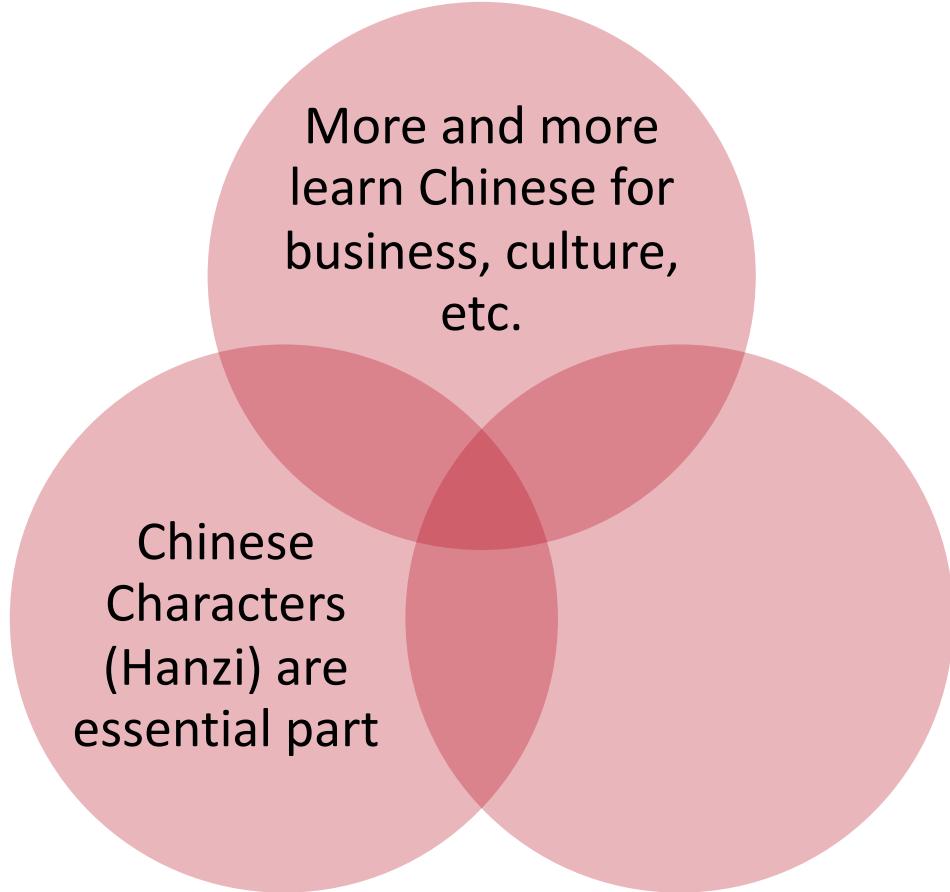
30 million non-native speakers
are learning Chinese (2015)



Sources: Ulrich Ammon, University of Düsseldorf

THE WASHINGTON POST

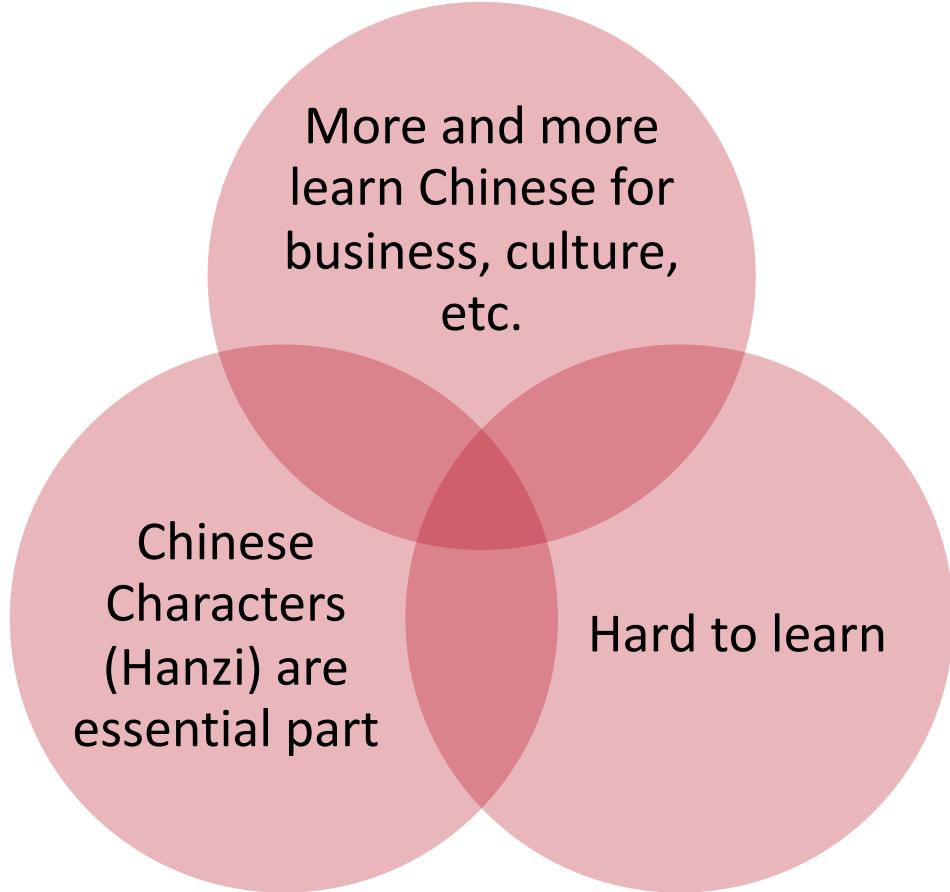
Motivation



Logogram, necessary for reading and writing



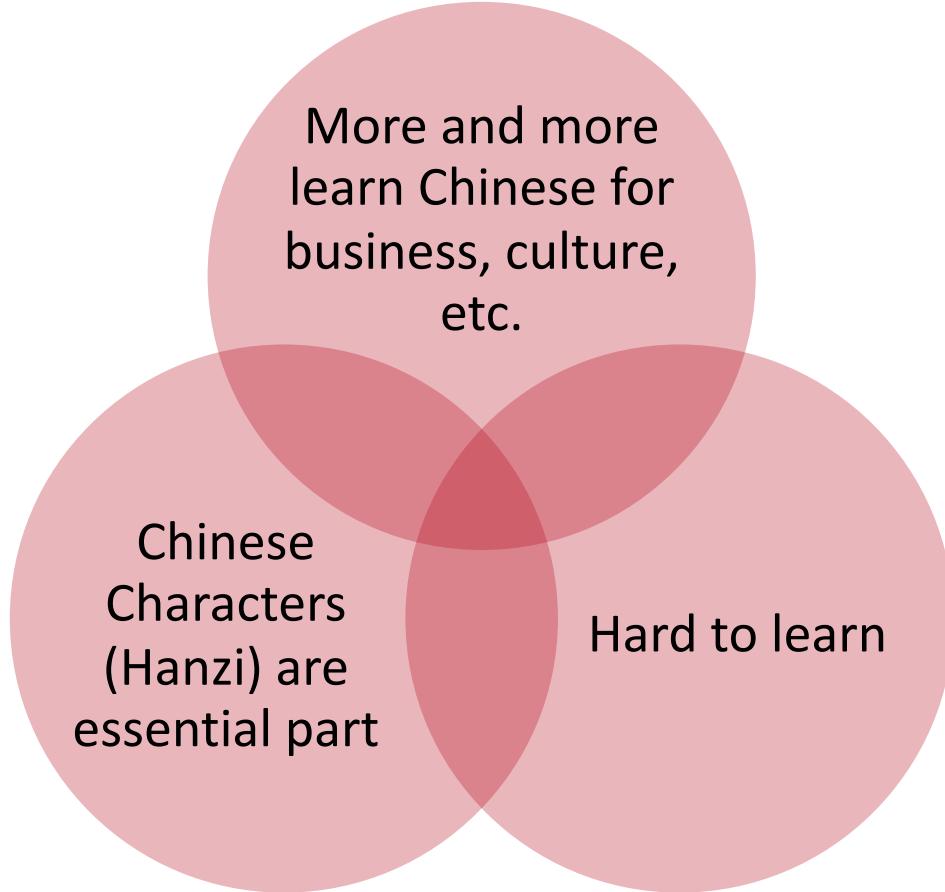
Motivation



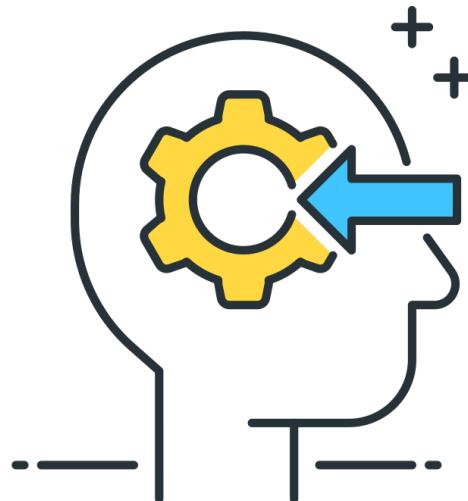
Logogram, necessary for reading and writing



Motivation



We offer an App which makes it easier, inspired by how the brain best learns



Theory

- Learn characters by rote



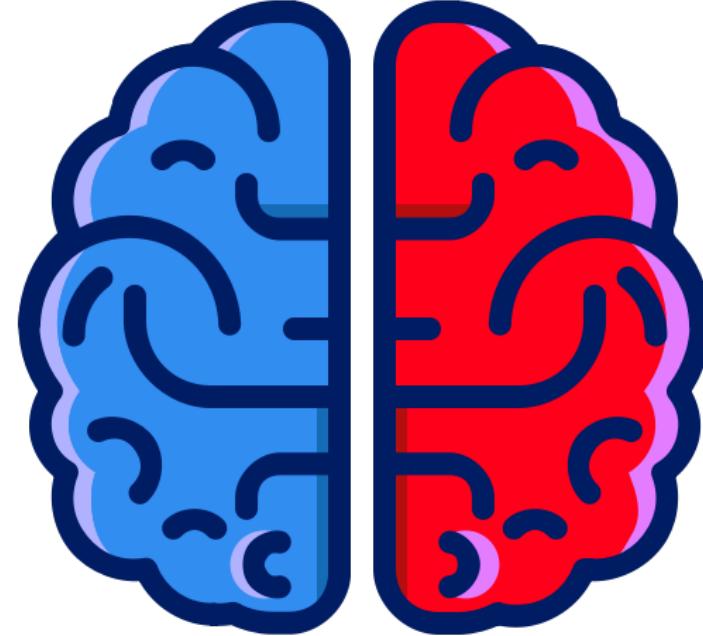
HARD

Dual Coding Theory of Reading and Writing (Paivio and Sadoski)

- Understand the etymology
- Understand the decomposition
- Use visual stimulus



EASIER



Logic

Images



Decomposition

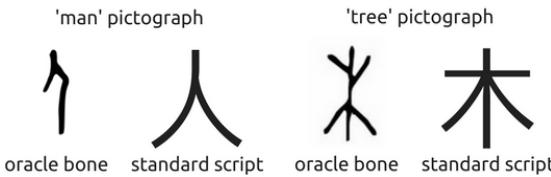


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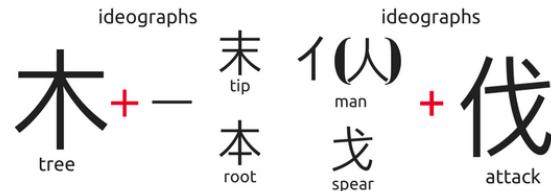


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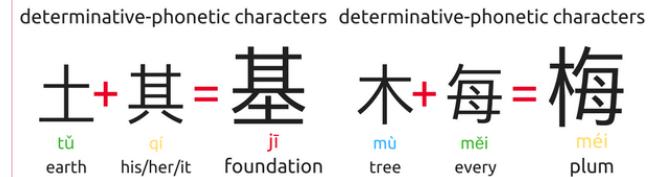
Pictographs



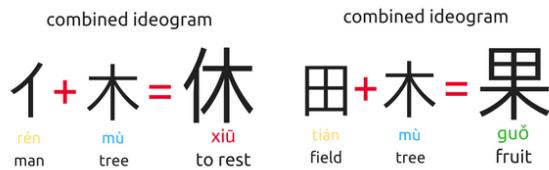
Ideographic



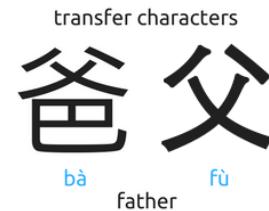
Determinative-Phonetic



Combined Ideographs



Transfer Characters



Loan Characters

The original meaning of the character 西 (west) was a bird in a nest. 许慎 said the bird rested in the nest when the sun was in the west and therefore gave the character over to 'west'.

App screenshots



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Scanning View



Detail View



Grid View

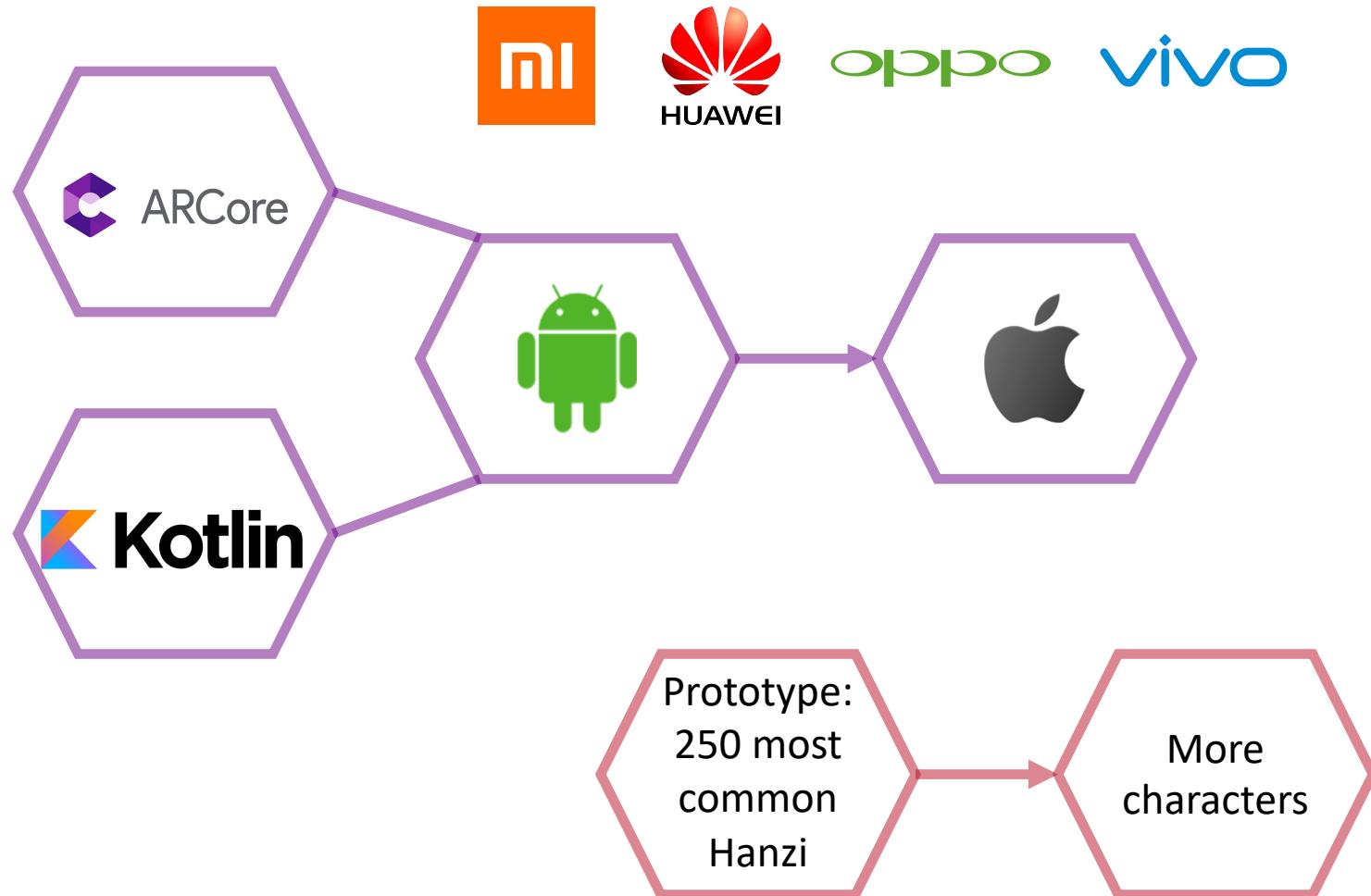
Technical App Description



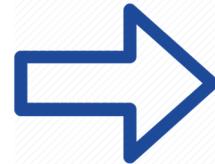
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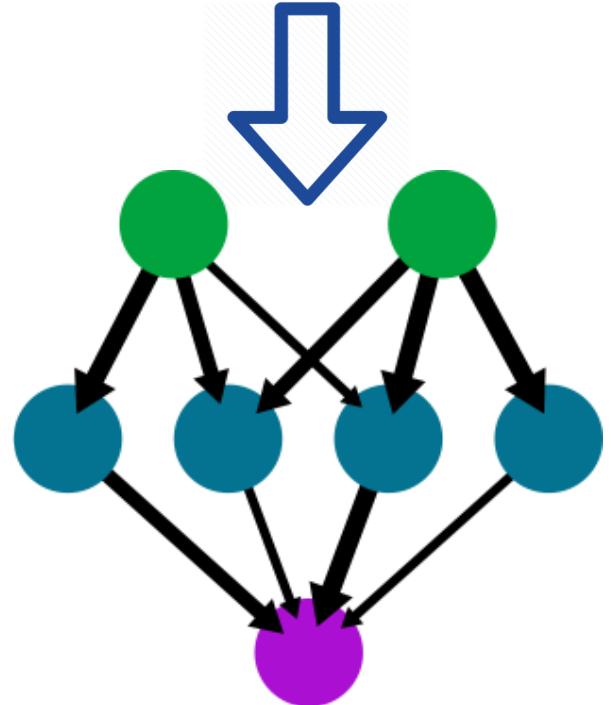
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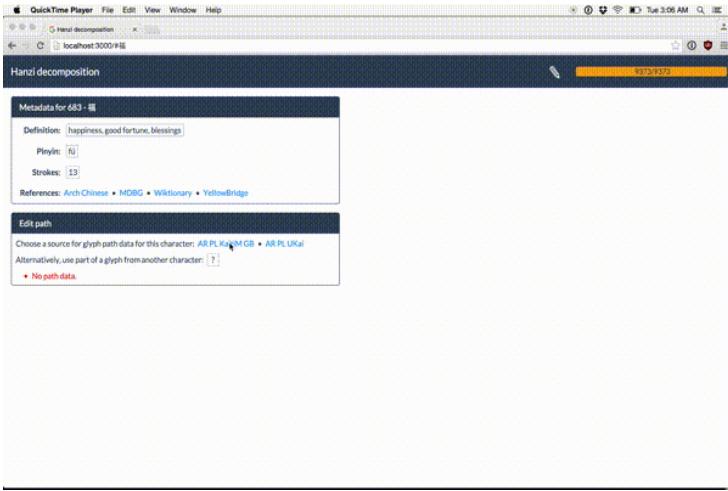
Character Detection



Histogram of Oriented
Gradients (HOG)



Dictionary



SVG from makemeahanzi

Dictionary

Basic mnemonics

Decomposition info

- Based on the decomposition, certain radicals get a special color
- Create 3D models
- Use Sceneform to convert them in the format the app wants
- Etymological Dictionary of Han/Chinese Characters - Lawrence J. Howell

<https://github.com/skishore/makemeahanzi>

[http://nihongo.monash.edu/Etymological Dictionary of Han Chinese Characters.pdf](http://nihongo.monash.edu/Etymological_Dictionary_of_Han_Chinese_Characters.pdf)



Why?

Chinese characters are important

What?

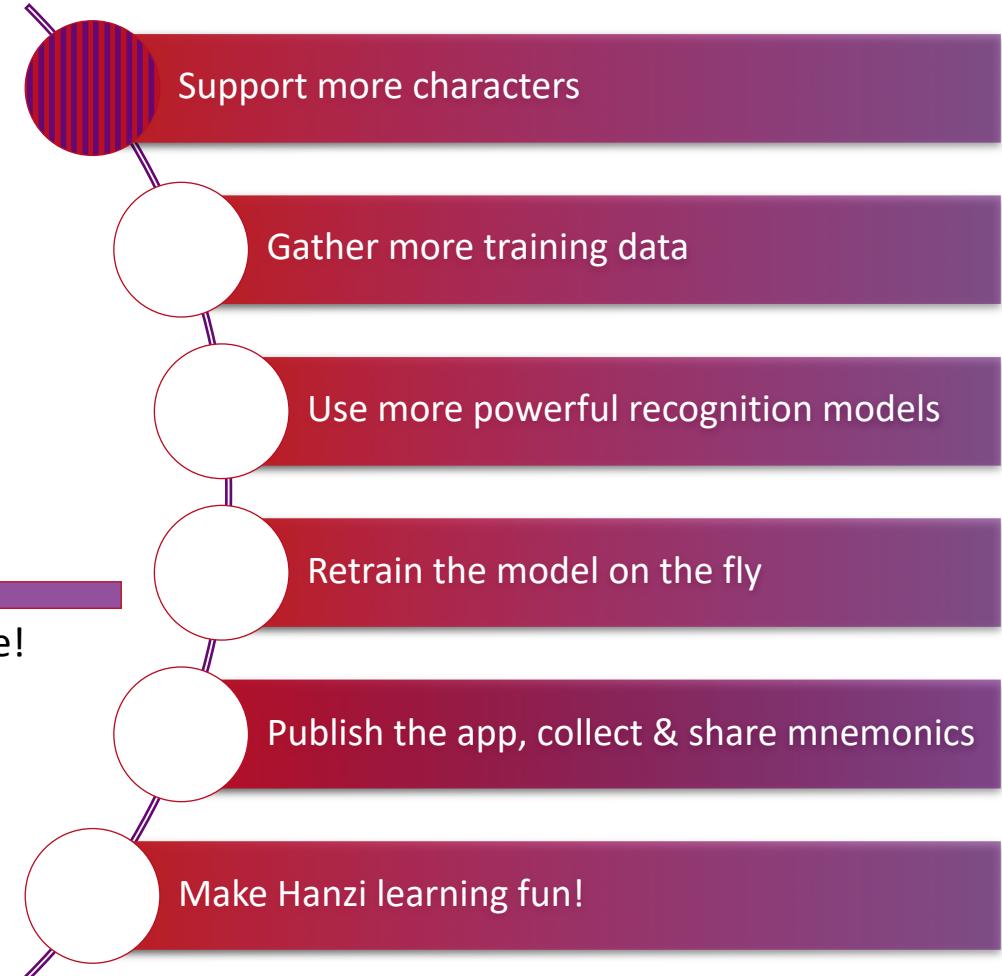
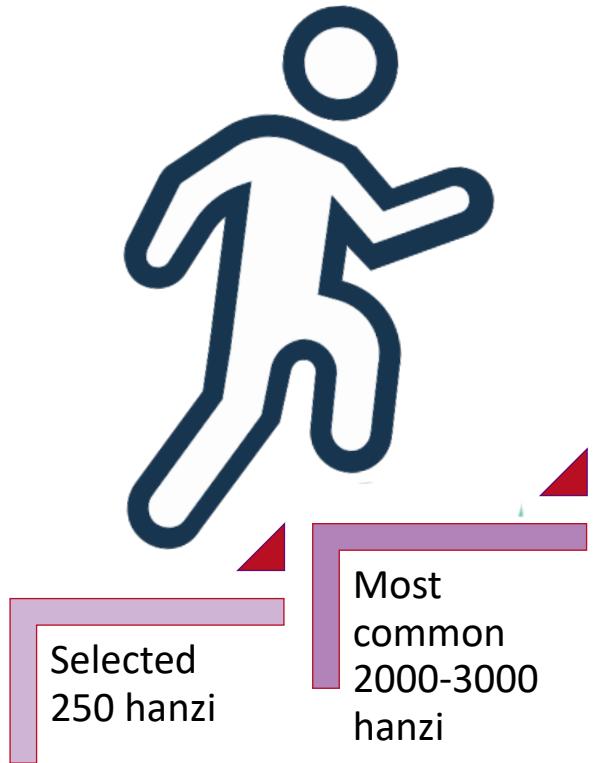
We want to engage users to play more with Hanzi

How?

We created an engagin app called Yangtao that uses Augmented Reality

We use brain research to improve learning, gamification, mnemonics, visual learning

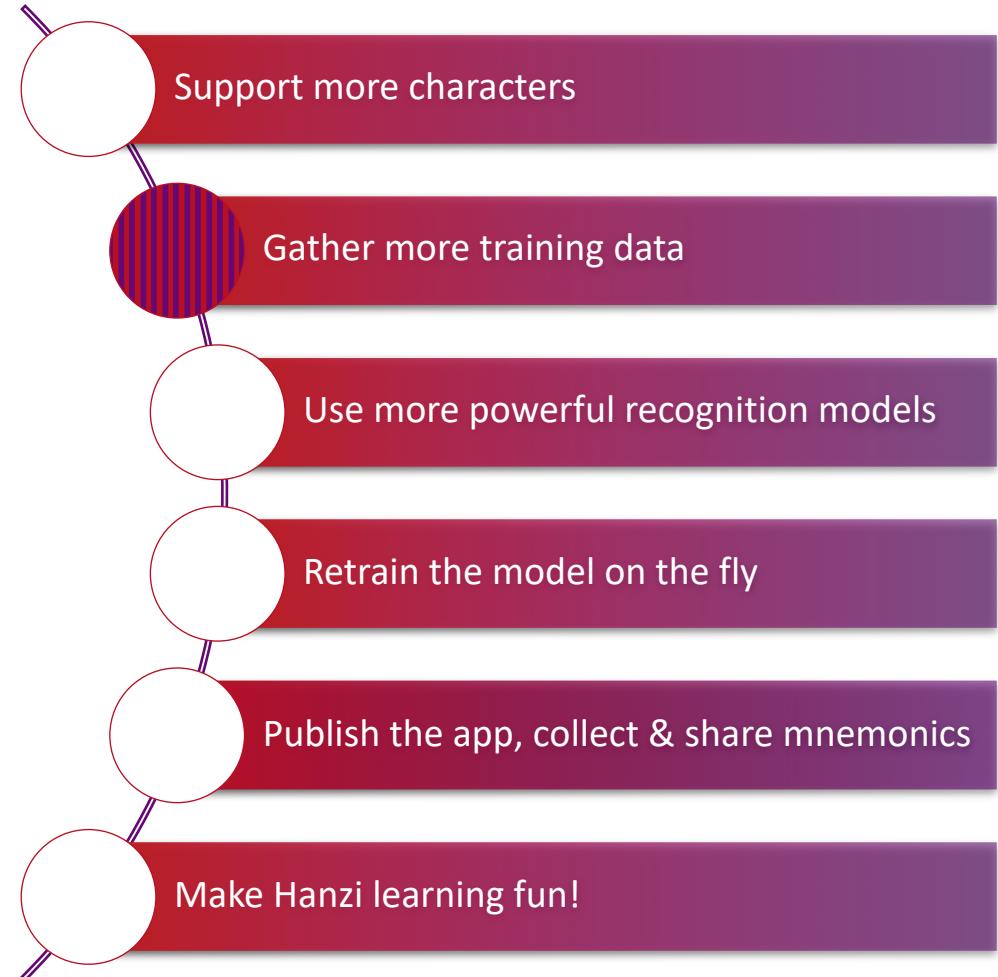
Future work



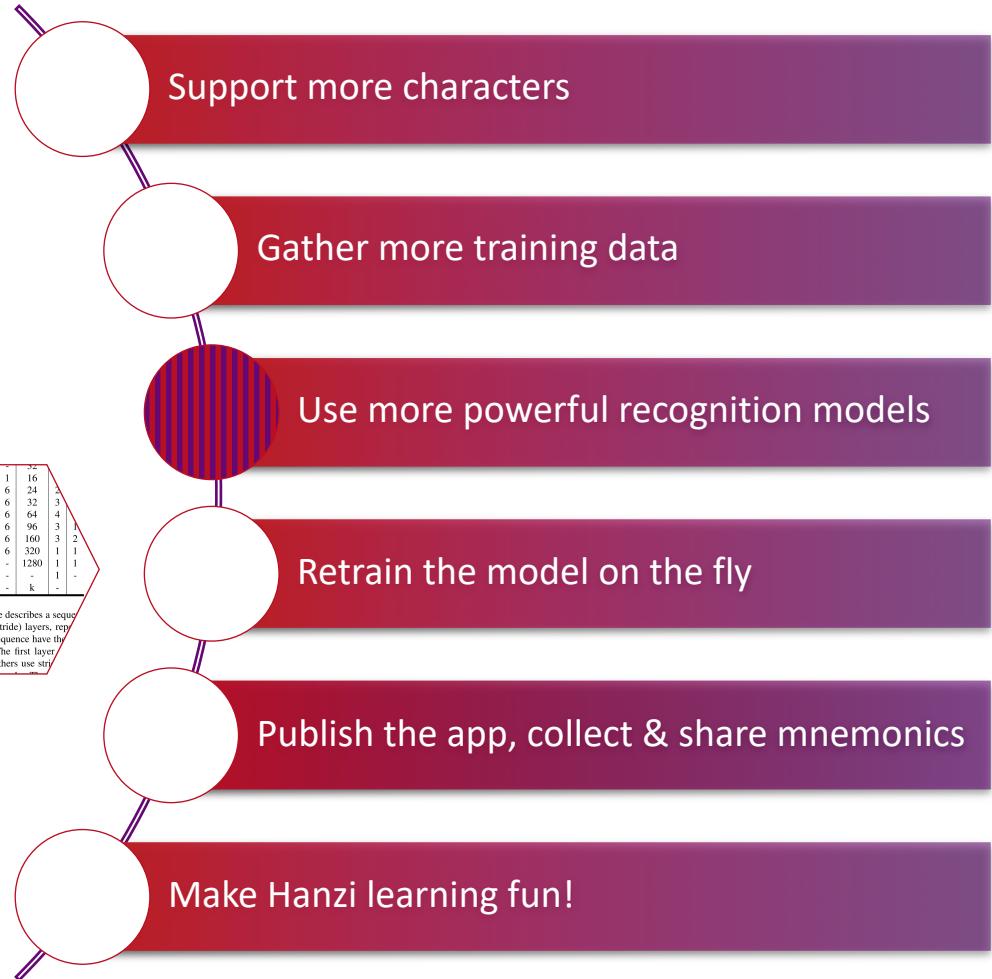
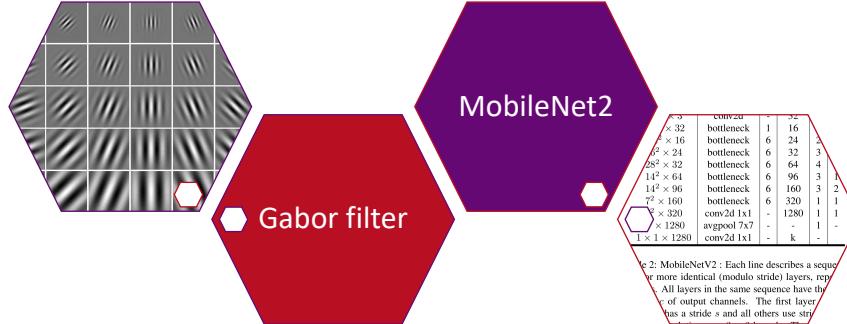
Future work



(maybe from users scans directly)



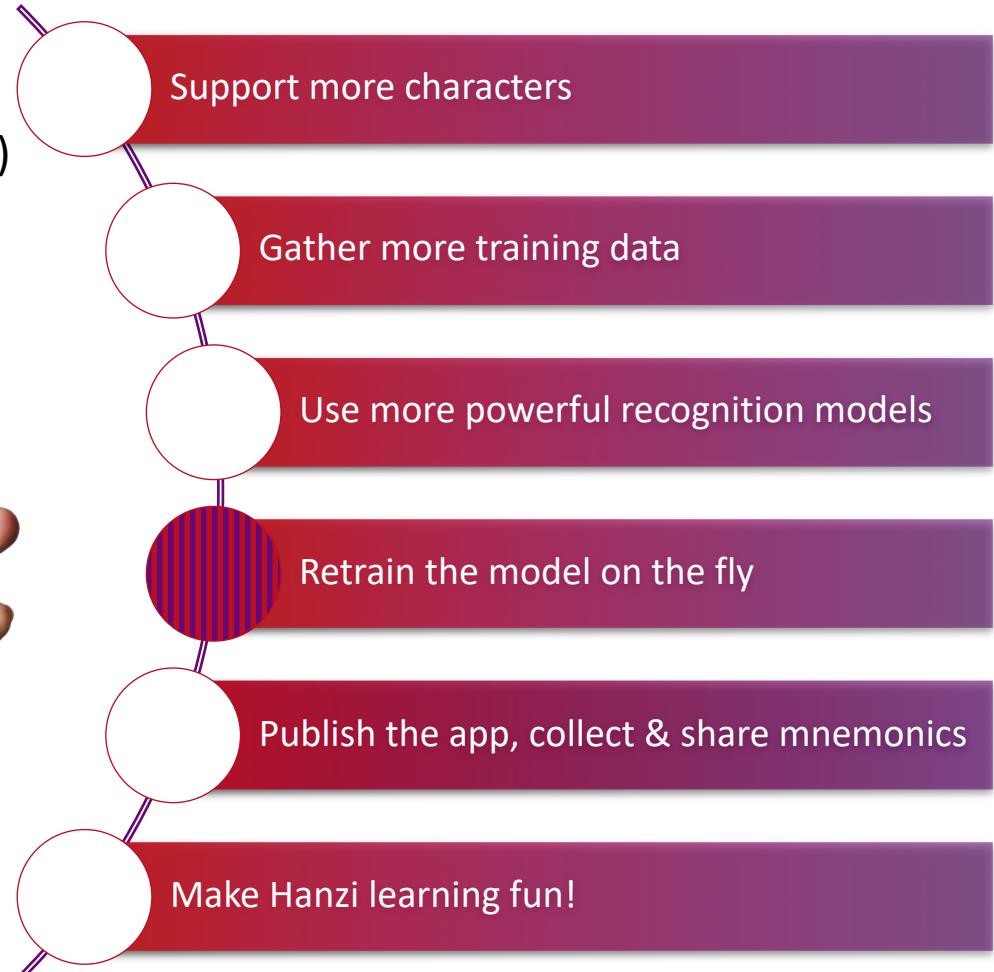
Future work



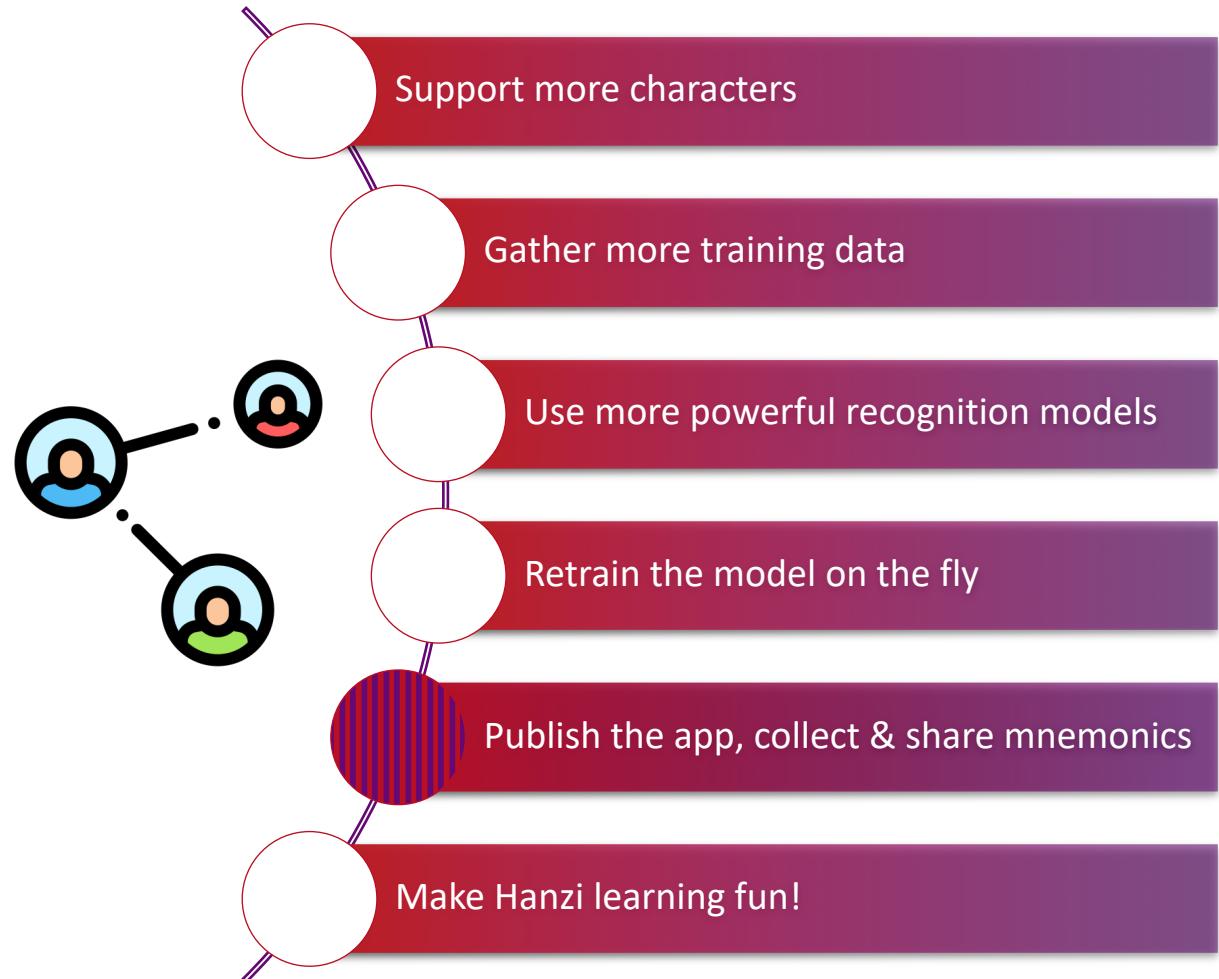
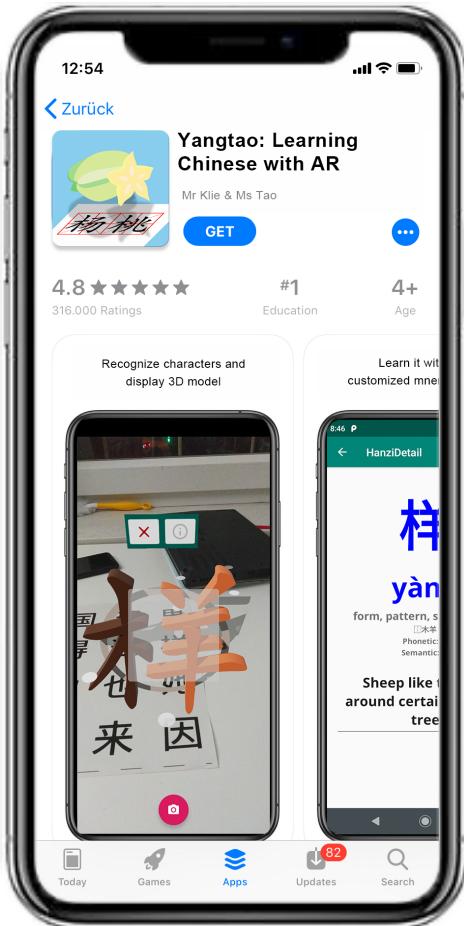
Future work



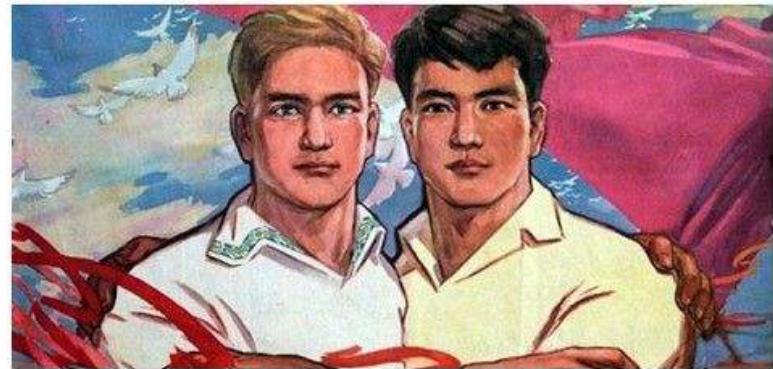
- based on user input (correct/wrong)
- like the brain does
- lifelong learning
- online learning



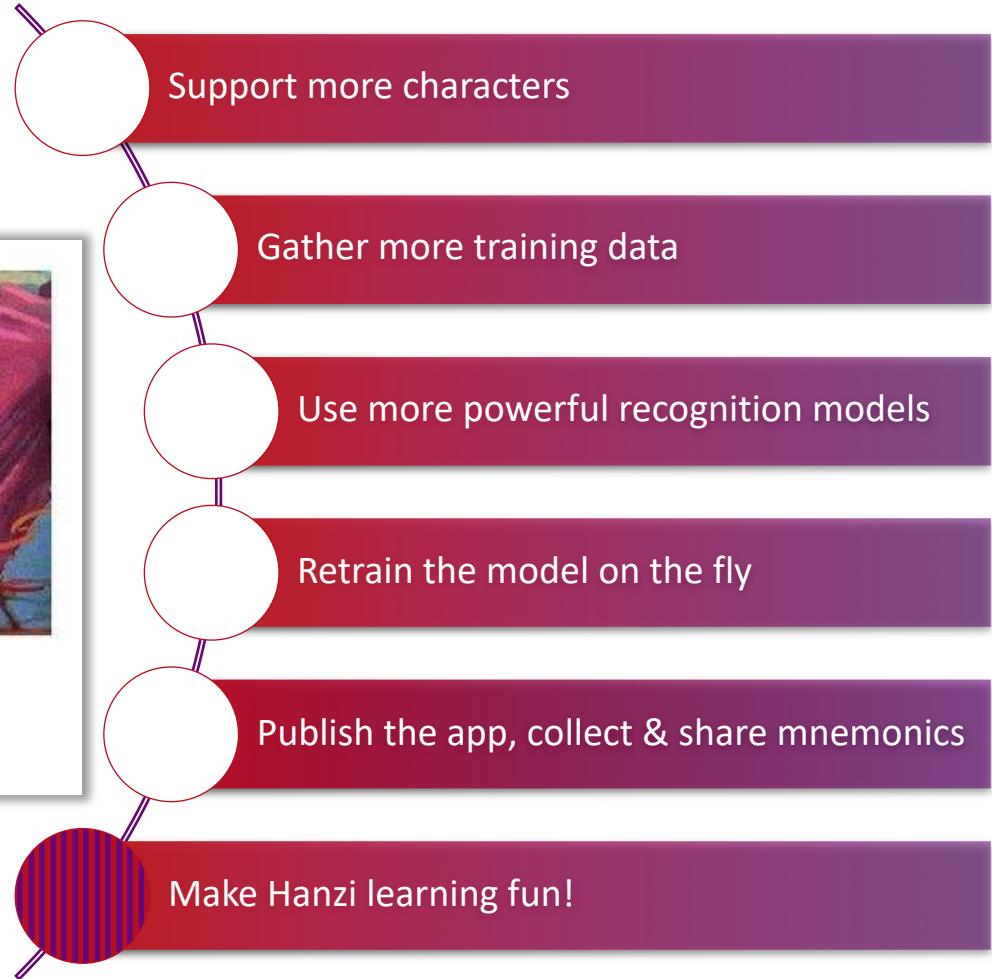
Future work



Future work



学习汉字使我快乐



Acknowledgements



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清华大学
Tsinghua University

- MakeMeAHanzi
- The Group of **Lianwen Jin of South China University of Technology** whose character data we use
- The dictionary **Etymological Dictionary of Han/Chinese Characters by Lawrence J. Howell**



Thank you!

谢谢/Danke

Q&A



Code and data available at:
<https://github.com/jcklie/iccbc-2019>