



DISTINGUISHING ADULTS AND CHILDREN BY ANALYZING THEIR HANDWRITING IN THAI LANGUAGE WITH DEEP LEARNING

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ABSTRACT

The problem of handwriting forgery is prevalent nowadays because it's easy for individuals to mimic someone else's handwriting, potentially for deceptive purposes or falsifying information. Adult and child handwriting can differ significantly in ways that are not easily distinguishable by the naked eye. Therefore, the use of Convolutional Neural Networks (CNN), specifically based on Residual Networks (ResNet) with an 18-layer depth, is seen as effective for analyzing and distinguishing between adult and child handwriting. To improve the accuracy of identification, we focus on which typeface to use. We utilize a standard font size of 200x200 pixels under consistent conditions, ranging from n to α , generating files for each character. These datasets are then loaded into the aforementioned neural network. In subsequent steps, we compile the characters with the highest identification rates and aggregate the associated words. We proceed with experimentation using the same steps. In characters achieving the highest accuracy, the identification rate exceeds 87%.

OBJECTIVE

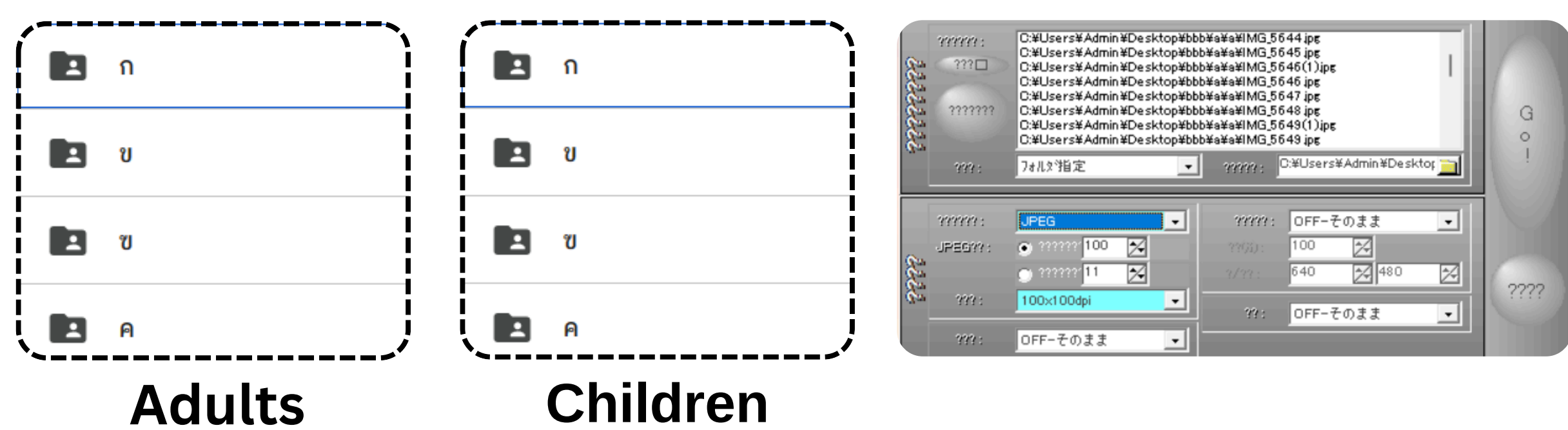
- Distinguish the handwriting of children and adults.
- Check from the handwriting whether the writer is over 19 years old or not.
- Increase the accuracy of the identification by changing the conditions of data set

METHODS

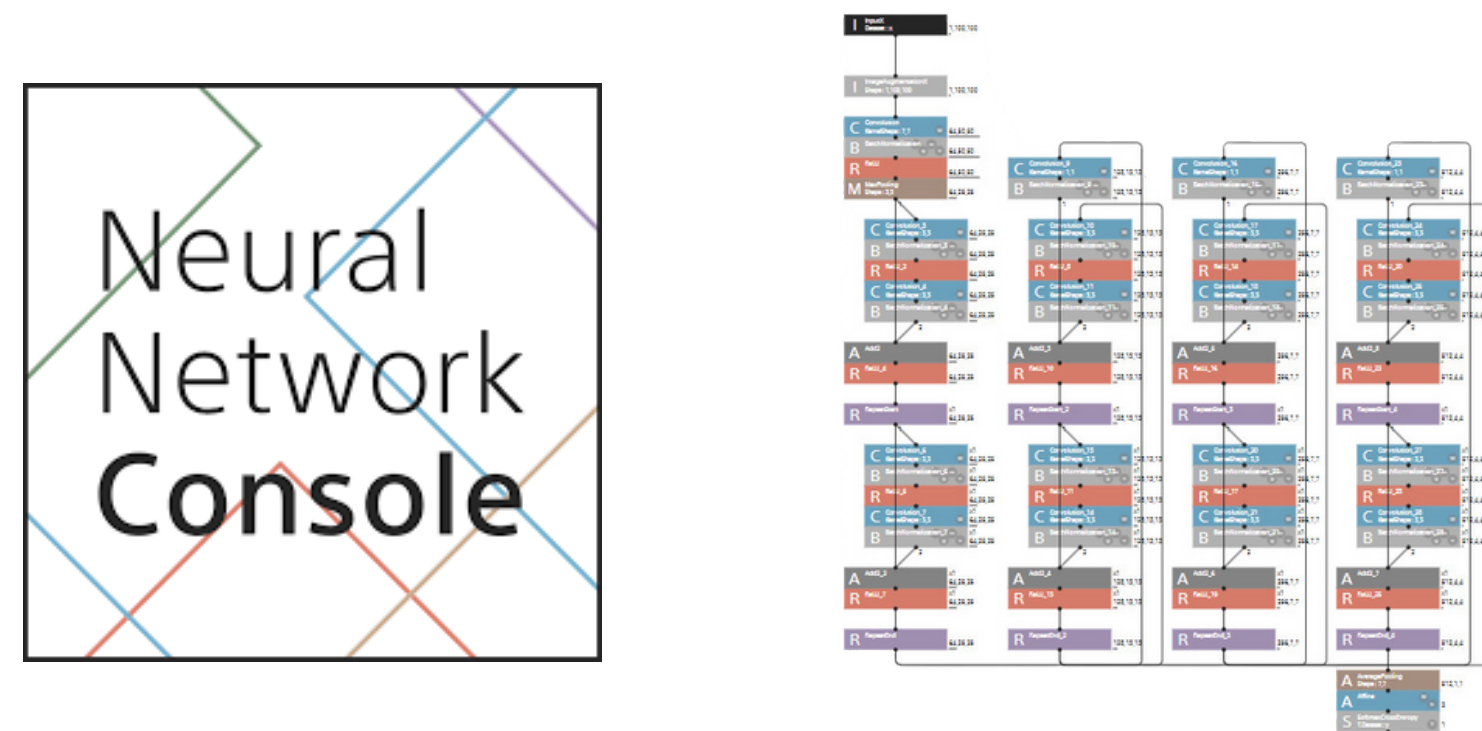
1 Collect the data from adults and children by using ibisPaint , apple pencil with 200x200 pixels



2 Compile folders of data Convert data folders to 100*100 dpi by using Batchgoo



3 Create a Neural Network based on ResNet18. by using Neural Network Console

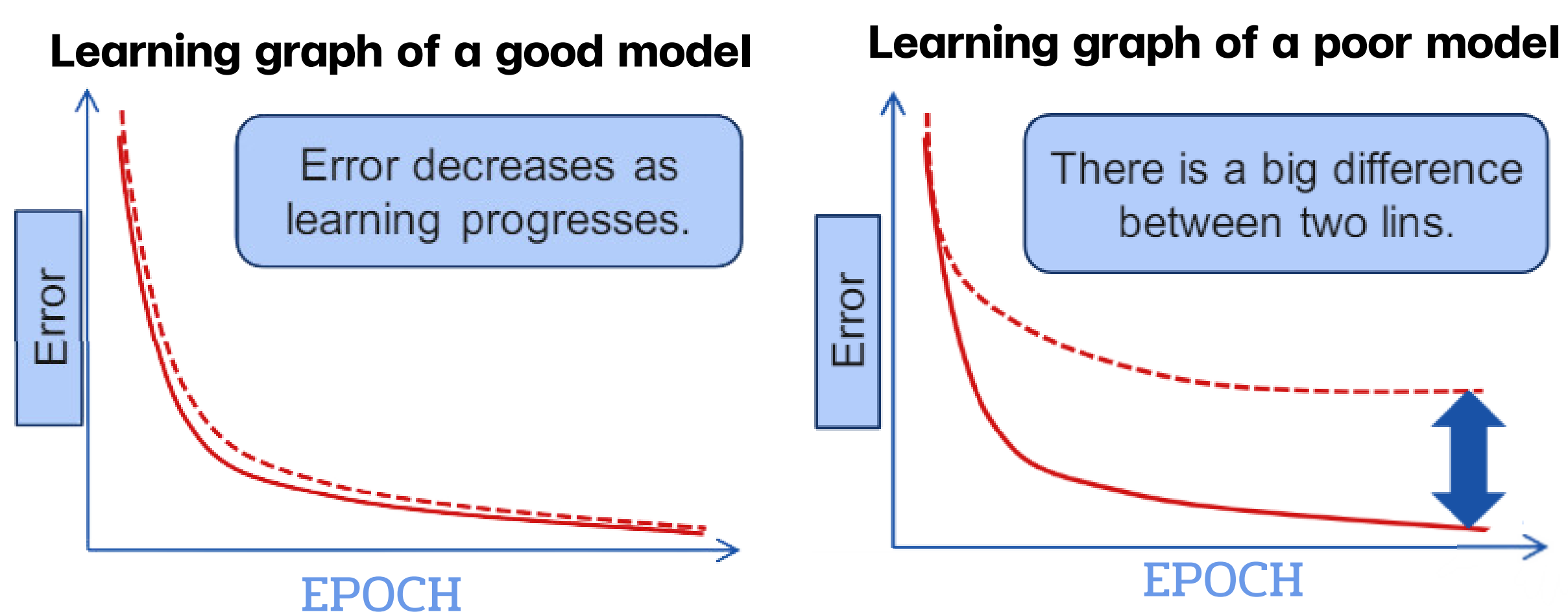


4 Start using Deep learning

Experiment	Adults	Children
Amount of data	10,560	10,560

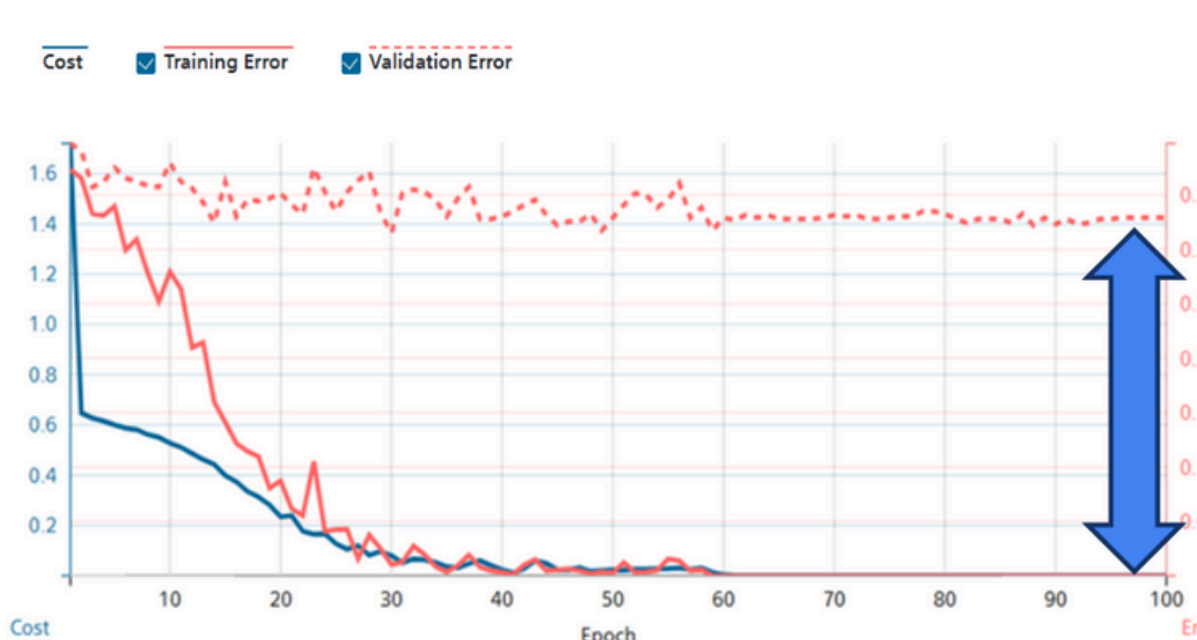
RESULTS AND DISCUSSION

Evaluation of learning Graph

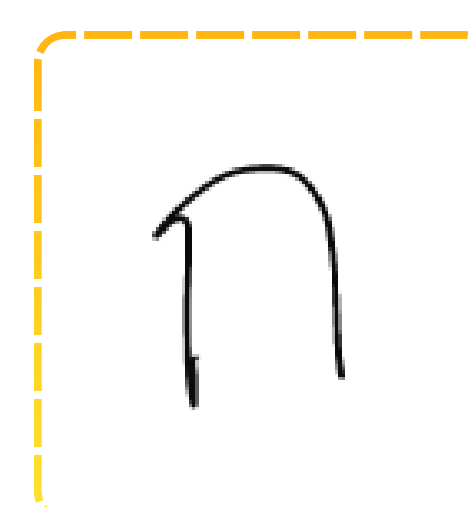


Analyze Graph and Data

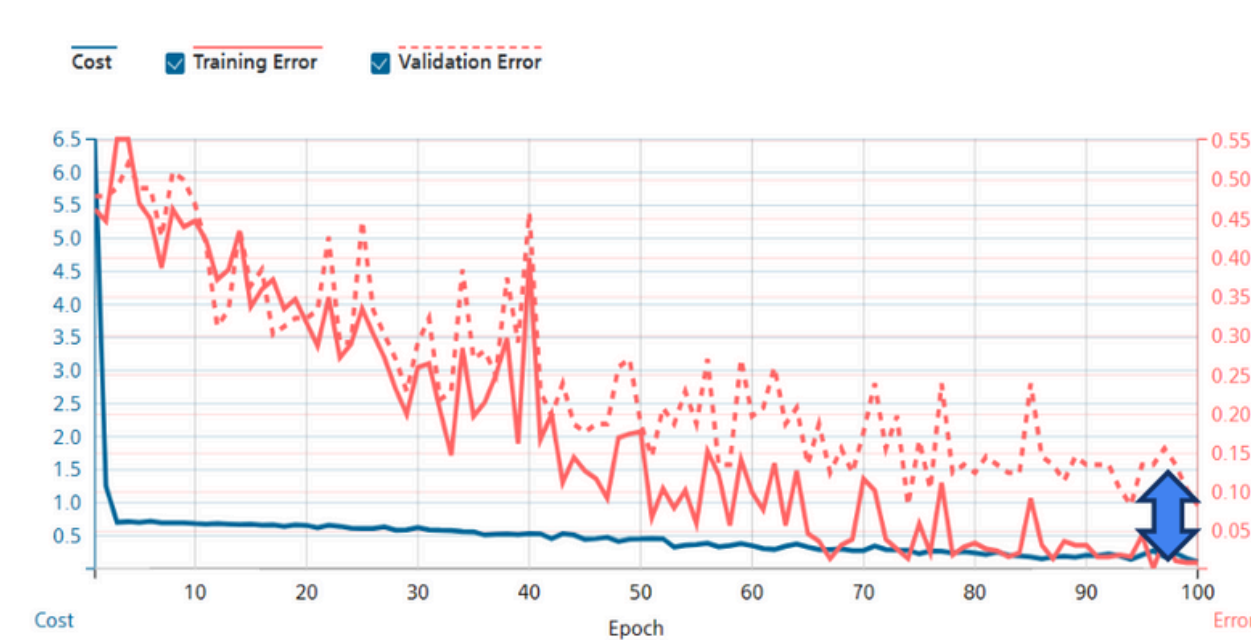
Learning curve with 74% discrimination rate



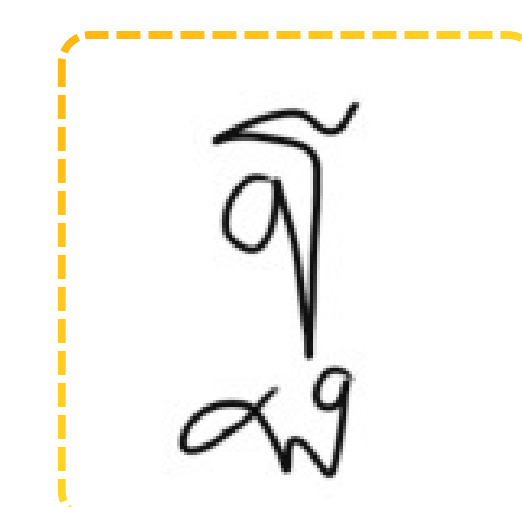
Accuracy	0.74
Avg Precision	0.74
Avg Recall	0.7435
Avg F-Measures	0.74



Learning curve with 87% identification rate



Accuracy	0.87
Avg Precision	0.87
Avg Recall	0.87147
Avg F-Measures	0.86



CONCLUSION

From this experiment, we were able to accurately determine the condition of the dataset, with letter α, β, γ showing an identification rate higher than 75%. If the two graphs were closer together, The chance of being more accurate increases. Finally, our study can be used to create programs to detect signed transactions for people over the age of 19 and reduce victims of online transactions.

References

- 1) Handwriting Analysis Using Machine Learning / Kenta Ooi / Makoto Sugita
- 2) Deep Learning Technical Survey / Takayuki Okatani / Graduate School of Information Sciences, tohoku University, Sendai