Research in VIP Research Group

Maiga Chang
maiga.chang@gmail.com
https://maiga.athabascau.ca
Discord: **.maiga**

Associate Dean of Research, Faculty of Science and Technology, Athabasca University, Canada
Full Professor, School of Computing and Information Systems, Athabasca University, Canada
Honorary Chair Professor, Multidisciplinary Academic Research Center, National Dong Hwa University, Taiwan (2023~2024)

IEEE Computer Society Distinguished Visitor on **AI** and **Chatbot** (2023~2025, https://www.computer.org/profiles/maiga-chang)
Distinguished Researcher Award 2022, Asia-Pacific Society for Computers in Education (APSCE)

Vice President, International Association of Smart Learning Environments (http://iasle.net)

Chair (2021~) of Educational Activities Committee, IEEE Northern Canada Section

Editor-in-Chief of Educational Technology & Society (SSCI, Open Access)
Editor-in-Chief of International Journal on Distance Education Technology (EI, SCOPUS & ESCI, Open Access)
Editor-in-Chief of Bulletin of Technical Committee on Learning Technology (ESCI, Open Access)

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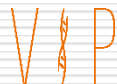
Required Skills

- ☐ Service
  - ■ PHP or Python
    - ☐ Python accesses mySQL/MariaDB with python3-mysql.connector or mysql-connector-python
    - ☐ Python and PHP uses shared variables (i.e., configuration/parameters) via import a config.py and include a config.php
  - ■ Running Python script that takes parameters from command line
  - ■ PHP executes a Python script with exec
- ☐ Server Side
  - ■ PHP
    - ☐ PHP uses MySQLi or PDO to access mySQL/MariaDB
    - ☐ PHP uses shared variables (i.e., configuration/parameters) via include a config.php
  - ■ SQL statements
- ☐ Client Side
  - ■ Browser app with CSS and JavaScript
  - ■ Android app development in Kotlin or Java and uses WebView
- ☐ Communication
  - ■ JSON as communication package format
  - ■ AJAX with XMLHttpRequest (not using jQuery)
- ☐ Configuration and Setup
  - ■ Terminal/Command mode in Ubuntu 20.04/22.04 or above
- ☐ Development
  - ■ Git commands
  - ■ SSH/Putty and SFTP/FileZilla with private key

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VIP Research Group's Youtube Channel

☐ https://youtube.com/@vipresearchgroup

■ encourage everyone to subscribe it

Research Streams

- ☐ Educational Game and Game-based Assessment Platform
- ☐ Text Summarization and Chatbot
  - ◼ AI (Natural Language Processing based)
  - ◼ AIML (Artificial Intelligence Markup Language)
  - ◼ RiveScript (Artificial Intelligence Scripting Language)
- ☐ Web and Mobile Application
  - ◼ Data Mining (Time-Series Behaviour Data Mining)
  - ◼ Generative AI

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Educational Game and Game-based Assessment Platform

- MEGA World
- Trading Card Game
- In-game Card as Educational Reward (ICER)

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MEGA World

MEGA World (Multiplayer Educational Game for All) is a web-based massively multiplayer educational game platform which supports any languages and is capable of access any existing external resources (e.g., multimedia, materials, online meetings, etc.). Teachers can create their virtual worlds as well as create learning and assessment activities (i.e., quests in the game) for students. Students can learn specific knowledge and reach the learning goal by taking and solving those quests while playing.

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MEGA World v3.0 (https://megaworld.game-server.ca)

Trading Card Game (TCG) and
In-game Card as Educational Reward (ICER)

Can we encourage students to do more for learning – via giving them in-game cards as educational rewards?

- Trading Card Game (TCG)

  - https://tcg.game-server.ca/

- In-game Card as Educational Reward (ICER)

  - https://icerweb.gameresearch.ca/

  - https://maiga.athabascau.ca/#icer

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Trading Card Game (In-game Card as Educational Reward)

Griffin

4-star card
Element: Air
Category: Flying
Size: XL
 (cost player 4 BL Pts as dies)
Health: 20
Attack: 13
Defense: 5
Range: 2

Silver Dragon

5-star card
Element: Air
 Category: Dragon
Size: XL
 (cost player 4 BL Pts as dies)
Health: 30
Attack: 15
Defense: 7
Range: 2

Learning

3-star trap card
stealing attacker's
50% attacking
power when under
opponent's attack

Card Return!

1-star magic card
forcing opponent
to take back two
cards from
the battle field

Text Summarization and Chatbot

- Ask4Summary
- Visualized Editing Environment (VEE) for building chatbots
- Speaking-based Conversation Quest
- and more, e.g.,
  - ChatbotLLM, Discordbot VIP-Bot, 5-Component Chatbot, etc.

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Summary Generation for User's Question

Ask4Summary reads materials uploaded by users so it can generate summary for user's questions asked online with their browser. Ask4Summary could be an online representative not only for online learning but is also capable of helping users on their questions regarding products, healthcare, etc. if there are correspondent text-based materials existing for Ask4Summary to read in advance.

Ask4Summary v1.0

☐ https://ask4summary.vipresearch.ca
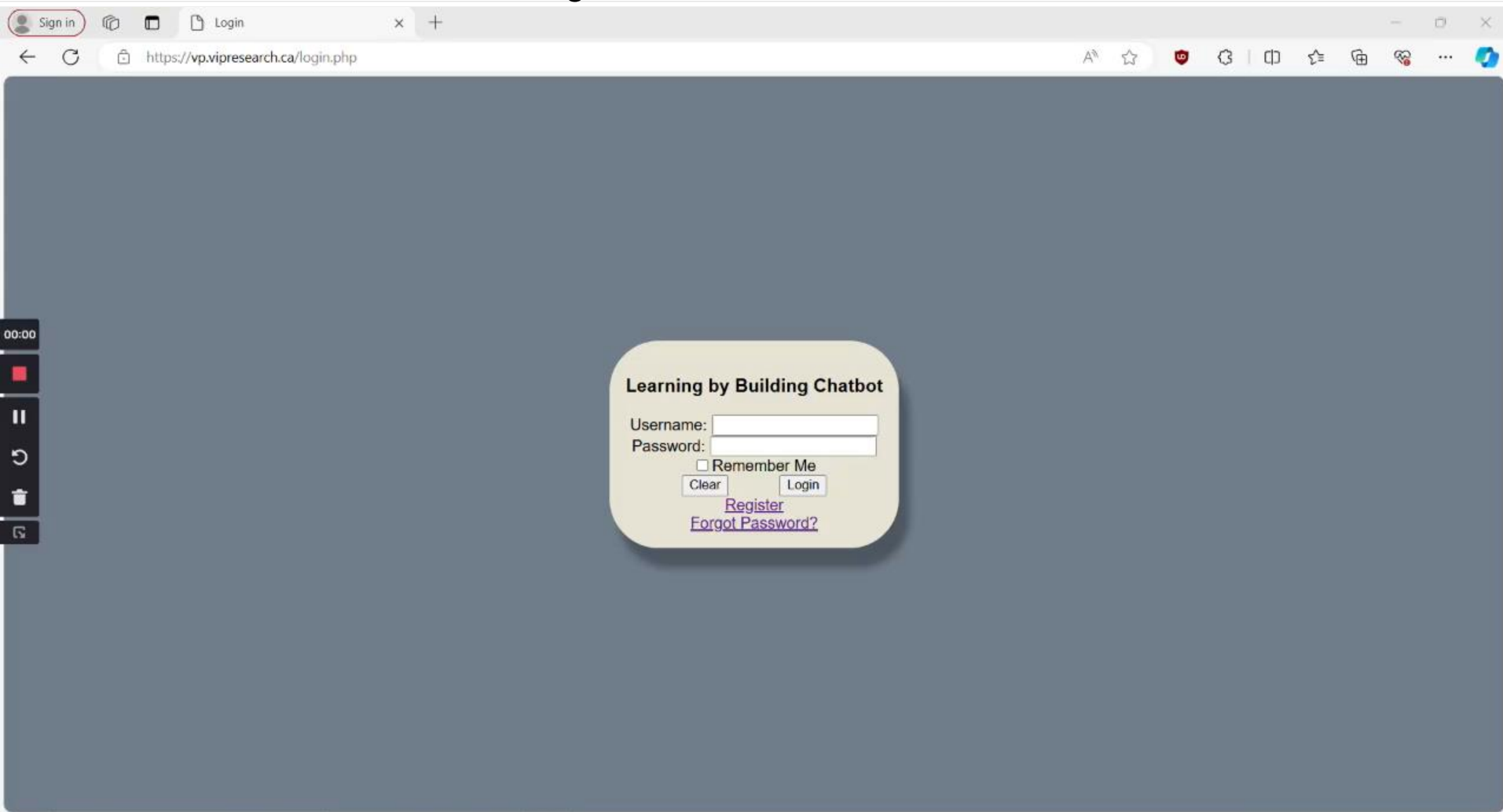
Ask4Summary v2.4

☐ https://ask4summary.vipresearch.ca

Visualized Editing Environment of Building Chatbot for Learning and Training

This research project will build a visual editing environment for users (e.g., course/program creators, lecturers, and mentors) to create their own virtual patients/seniors through working independently, adopting, and altering existing virtual patients shared by others, or co-creation. All the created virtual patients/seniors will be transformed and stored in RiveScript form, but the users do not need to know anything about RiveScript while creating them in the visual editing environment.

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VEE – Creating Your Own Chatbot in Any Way

- ☐ https://vp.vipresearch.ca/
- ☐ Puzzle Piece Like Editing Environment

VEE – Utilizing Different Chat Service Providers

☐ Ask4Summary (https://ask4summary.vipresearch.ca)

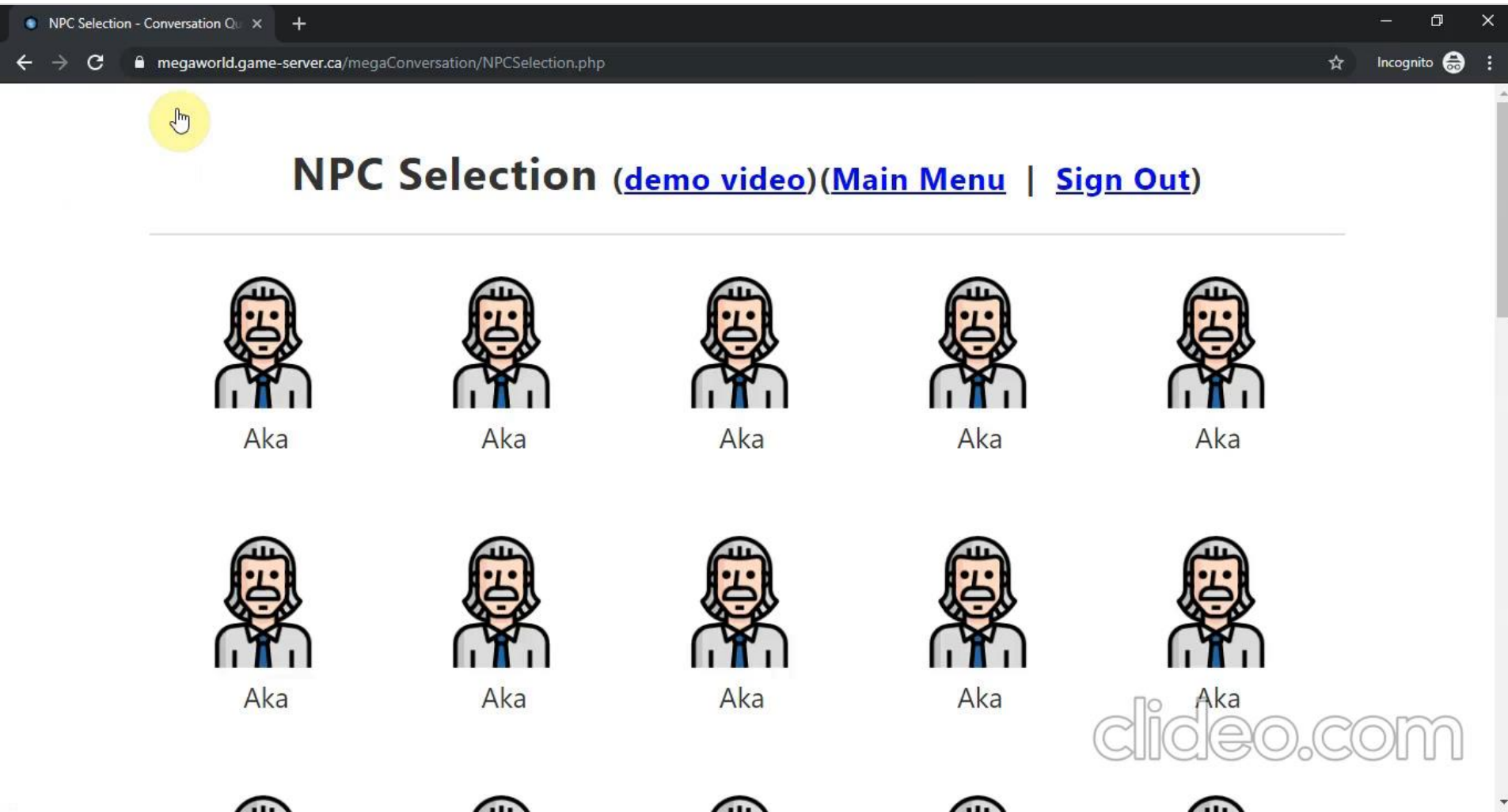☐ ChatbotLLM (https://chatbot.vipresearch.ca)

☐ Open AI's GPT

Speaking-based Conversation Quest

Providing Students opportunities to practice speaking skill in a no-pressure environment where teachers can (co-)create conversations for various topics like Restaurant, Lodging, and Transportation and students can and need to "speak" to the NPCs (Non-Player Characters, or says computers) with appropriate responses.

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Student can practice with NPC

☐ https://conversation.megaworld.game-server.ca

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Student can practice with NPC (Spanish)

Student can practice with NPC (Chinese)

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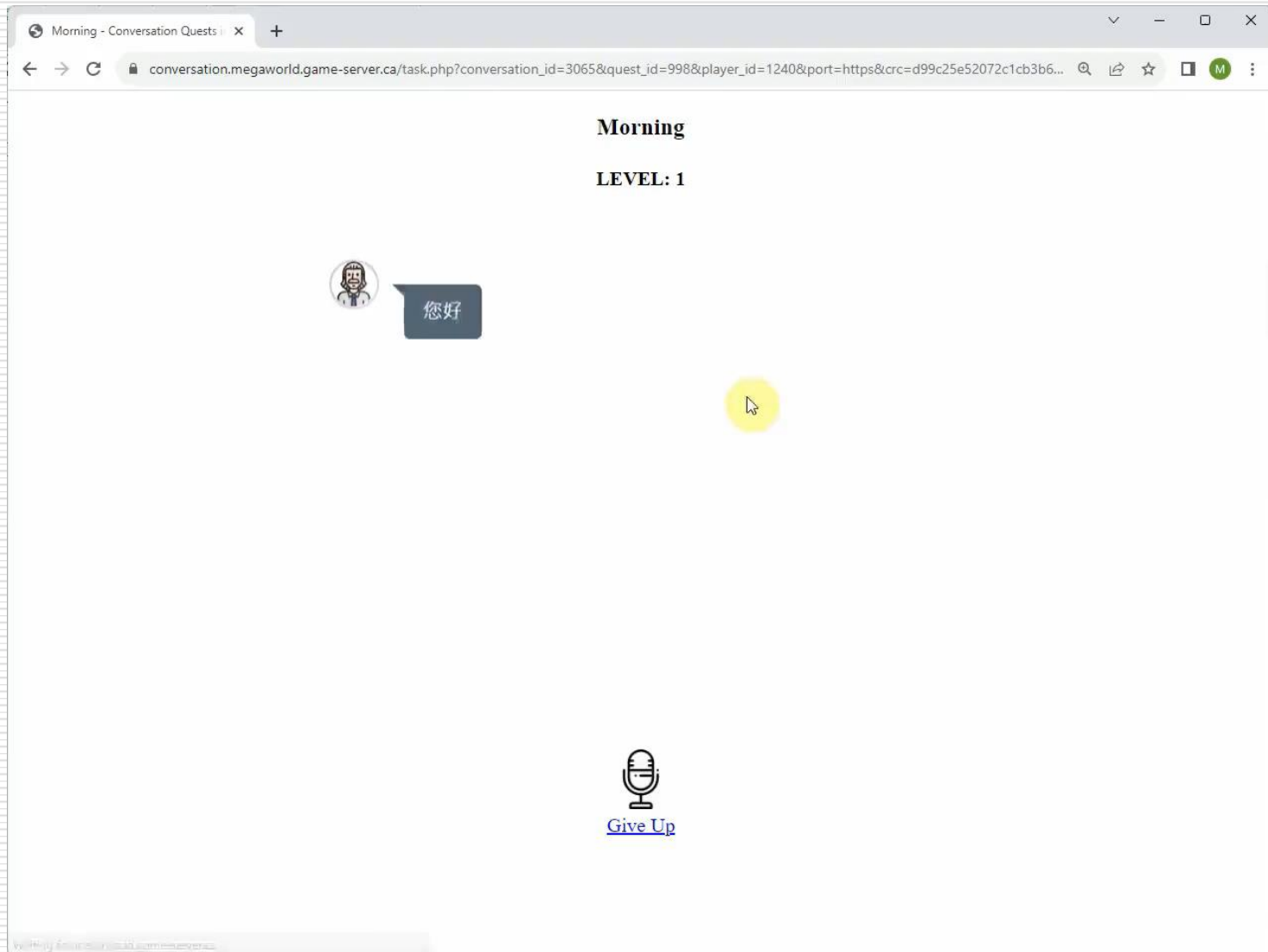
Student can practice with NPC (Japanese)
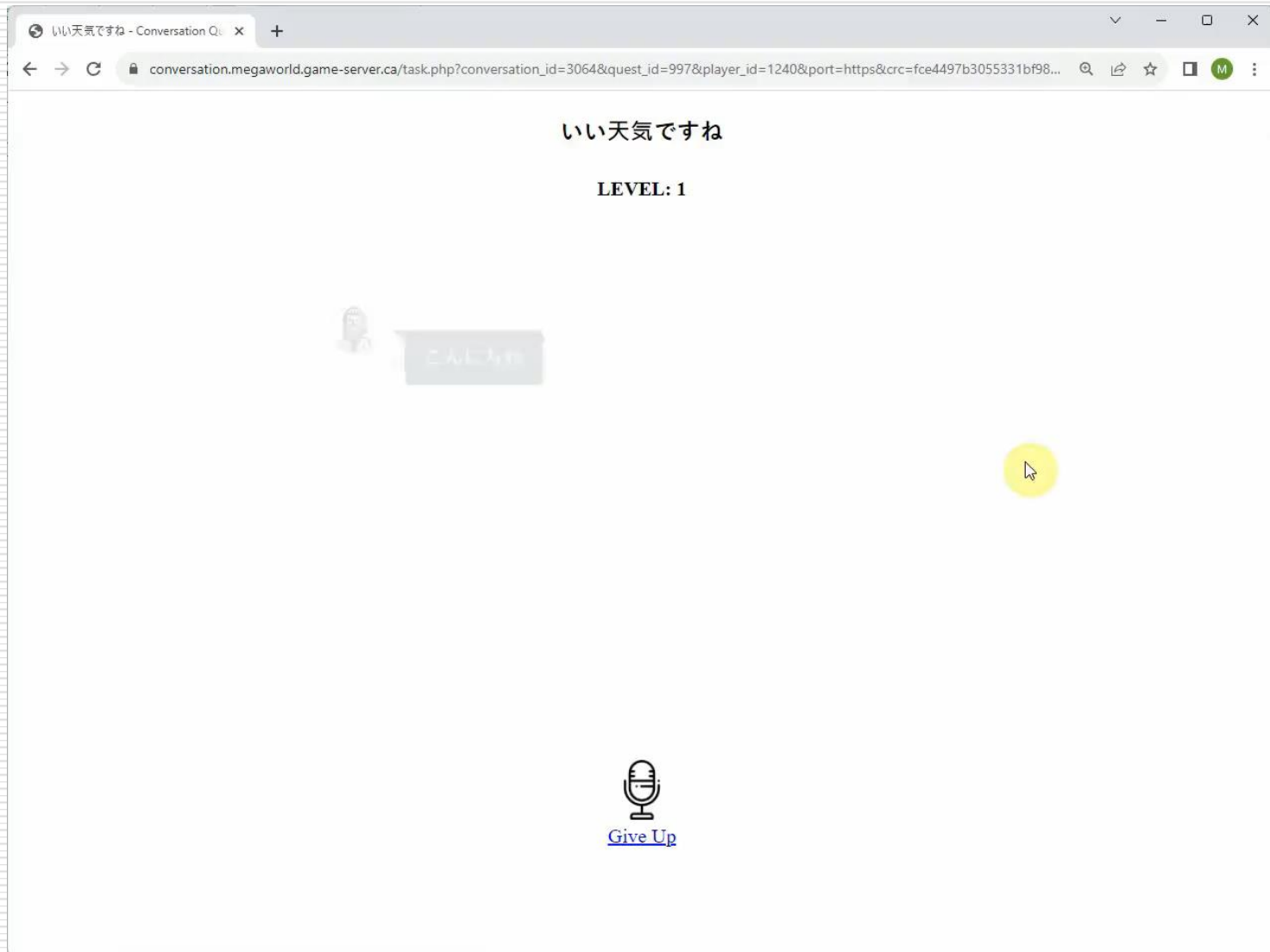
Web and Mobile Application

- Authorship Forensics

- Next-Stop Recommender

- and more, e.g.,

  - Personalized Study Guide, Learning Object Relation Discovery (LORD), Behaviour Analytics, Note Takers, etc.

Authorship Forensics

Can we have a better way to train computer to differentiate AI-written text?

Take advantages of

- Valid N-Gram and PoS Identifier v1.2
  - Statistical Natural Language Processing
- Convolutional Neural Network

https://ngrampos.vipresearch.ca

Add Model Classes: Three Min Docs: 0 Max Docs: 0 Train %: 0.80 Auto %: 0.1 Threshold %: 0.995

```
importing tensorflow libraries: 2.781642436981201
importing custom libraries: 0.0023014545440067383
various variable assignments and file creations: 0.0027098655700683594
getting authors_data based on the number of classes: 0.0027418136596679688
filtering authors_data by minimum number of docs: 1.9073486328125e-06
filtering authors_data by maximum number of docs: 2.384185791015625e-06
creating the unique authors list: 0.00016665458679199922
labeling the data and resizing the images: 58.84820365905762
assigning images to np arrays and converting author names to ints: 0.741199254989624
creating or loading the models: 0.3450171947479248
training the model_top_5 model: 2263.111414194107
training the model_top_15 model: 1201.8730993270874
training the model_top_50 model: 787.811089515686
Total time spent training all models: 4315.519589662552
```

The proposed 3-stage Authorship Forensics approach

☐ A model trained

- ■ the 2-class (human and ChatGPT)
  - ☐ can be trained in 56.82 seconds
  - ☐ achieve precision 0.9682 ($F_{0.5}$ score 0.95)
- ■ the 3-class (human, ChatGPT 3.5, and ChatGPT 4)
  - ☐ can be trained in 7 minutes and 26.076 seconds
  - ☐ achieve precision 0.9806 ($F_{0.5}$ score 0.96)

☐ Low requirement on the size of the training data

- ■ trained with 60:40 training and testing data subset
  - ☐ the training subset contains around 381 texts
    - ■ 343 texts for training and 38 texts for validation

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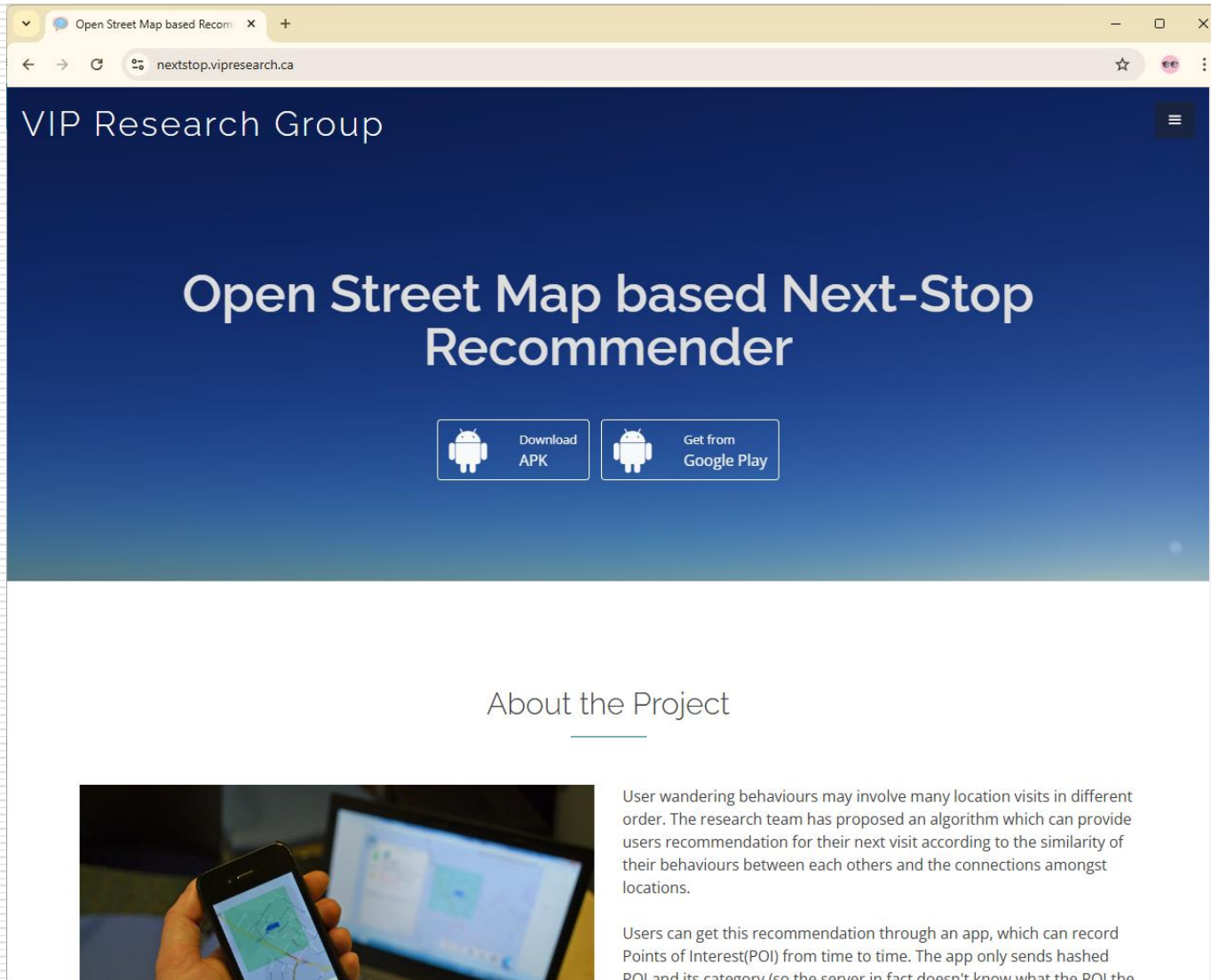
Next-Stop Recommender

User wandering behaviours may involve many location visits in different order. The research team has proposed an algorithm which can provide users recommendation for their next visit according to the similarity of their behaviours between each others and the connections amongst locations.

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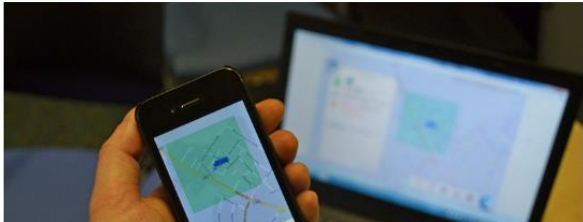# Next-Stop Recommender

☐ https://nextstop.vipresearch.ca

WeChat

LINE

Thank you so much!

Maiga Chang

maiga.chang@gmail.com

https://maiga.athabascau.ca

Discord: **.maiga**

TCG

OMEGA

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