Research and Development on Multilingual, Multimodal, and Multicultural Application of Large Language Models for the ASEAN Region

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Background :

Large Language Model (LLM)

- Representing the state-of-the-art techniques of Artificial Intelligence
- An infrastructure with strong capacity to encode the real world

Mechanism of LLM: Integration of diverse sources of information

- Texts : encoding systems with abstracted symbols from languages
- Images/Videos : Less abstracted, multi-modal information

Crucial Issue of Applying LLMs

- To organized adequate data from diverse sources
- Integrated training/evaluation/application frameworks

Targets:

- To establish an ASEAN platform to collect and utilize

  Multilingual, Multimodal, and Multicultural Resources

  for LLMs, and

- To enhance a virtuous

  Training, Evaluation, and Application Circle

  for the SOTA AI techniques, represented by LLM, in the ASEAN region.

Proposed Method: Scientific and Technology

- **Multicultural related topics**
  - Even for minor languages with limited data, **the distribution of common words, phrases, expressions have been modelled well in SOTA LLMs**.
  - Once turning to **more cultural related topics**, where interlingually obscure, but locally familiar concepts appear, **LLMs may crucially fail** in modelling semantics.

  → Intentional preparation and collection of data with concepts of local daily life, customs, religions, etc.

- **Multimodal resources**
  - A large portion of local culture-related textual resources are still **not digitalized**, in the form of paper media, which need scanning and recognition.
  - To describe local concepts more informatively, **images or videos are required** rather than bare textual description by abstract concepts in natural languages.

  → A multimodal collection of data which will be covered by this project.

- **Technique Development**

  The LLM provides a powerful methodology to **integrate multilingual and multimodal sources**.

  → Fine-tuned LLM to adapt the multicultural data

  → A joint application of text recognition, automatic translation, and image (character) style transfer

Proposed Method: Implementation

- **Data Collection**
  - Collecting available digitalized data: **textual** and **multi-modal**
  - Digitalized non-digitalized data: mainly **textual**
  - Creating new digitalized data: **multi-modal**

- **LLM Evaluation and Fine-Tuning**
  - Evaluation SOTA LLMs by culture-related QA/Cloze tests
  - To realize **a fine-tuning/evaluation circle** for infrastructural LLM development
    - **SEA-LION** as a baseline platform

- **Multi-Modal Technique Development**
  - Based on NICT's R&D
    - A robust translation approach for complex writing systems in Asian
    - A demonstration system of in-image/video translation

Proposed Method: Experiments

- **LLM Evaluation**
  - On various topics
    - Common Cultural Background in ASEAN countries
    - Multilingual Reasoning Based on Local Common Sence
    - Gender Bias and Stereotype
    - Hateful and Profanity Detection
    - …

- **Integration of Translation and Image/Video Processing**
    - OCR + Translation + Font Embedding in Images (for Manga)
    - Real-Time Multi-Lingual Recognition + Translation + Embedding in Video
    - Robust Sign-Language Translation
    - …

Impact

- **Scientific and Technology**

  As the representative SOTA AI technique, LLMs will change global communication profoundly in predicable future. Along with the research and development (R&D) of general techniques, the localization for application of downstream tasks is also crucial to connect SOTA technologies to daily life and economic activities.

- **Societal**

  This project aims to bridge and balance the R&D for LLMs and its local applications at the ASEAN region. The collected data, trained LLMs, and developed applications will promote the penetration of SOTA AI technology in the ASEAN region. Furthermore, the platform and community realized during the accomplishing of this project will accelerate the development of a virtuous training/evaluation/application circle of AI in the local area.

- **Collaborative**

  As an area with large population, various cultures, and rapid economic development, the ASEAN region can benefit from the execution of this project and will play a significant role in the AI global community in the recent future.

Output/Outcome

- **Data**
  - A platform for data organization and distribution
  - Centered in texts with integration of multi-modal data
  - For ever-growing data in contemporary society

- **LLMs**
  - Fine-tuned and well-evaluated culture-aware LLMs
  - LLM-based multi-modal translation systems

- **Community**
  - More members and researchers in ASEAN
  - Especially for low-resource languages processing
  - Especially for fostering young researchers

Conclusion

Target: For the ASEAN region, to develop LLMs

- Multilingual, multimodal, and multicultural resources
- Training/evaluation/application circle

Method

- Data Collection
- LLM Evaluation and Fine-Tuning
- Multi-Modal Technique Development

Impact

- ASEAN Localization for LLM Application
- Significant role of ASEAN in the AI global community

The First Workshop on Asian Multi-Cultural Large Language Models

- Organized by NICT
- On 5th Dec. 2025, at Universal Communication Research Institute (Kyoto)

Participants

- Representatives from Cambodia, Indonesia, Vietnam
  - Supported by NICT internal international development funding 2025
- Representatives from other interested ASEAN organizations
  - Myanmar, Thai, …
  - **Still open for online participation/presentation application**

Topics

- Resource and Evaluation of LLMs for languages in the ASEAN region
- Anything about LLMs for ASEAN languages

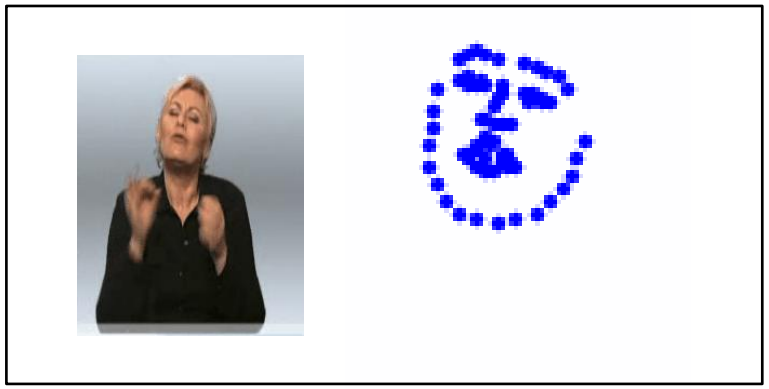
Something More: Developed Techniques and Demos @ NICT

Multi-lingual and ASEAN language processing

- Z. Qu et al. **Registering Source Tokens to Target Language Spaces in Multilingual Neural Machine Translation**. In Proc. of ACL, Vol. 1, pp. 21687--21706, 2025.
- Z. Qu, et al. **Languages Transferred Within the Encoder: On Representation Transfer in Zero-Shot Multilingual Translation**. In Proc. of MT Summit, Vol. 1, pp. 81--98, 2025.
  - SPRINGER EAMT 2025 BEST PAPER AWARD
- H. Kaing et al. **Robust Neural Machine Translation for Abugidas by Glyph Perturbation**. In Proc. of EACL, Vol. 2, pp. 311--318, 2024.

Demos

- End-to-End Sign-Language Translation with Facial Key-Point Recognition (Left)
- Scene Text Translation for Complex Writing Systems (Right)



Program for accepting trainees from overseas

- International Internship-Trainees
  - For Individuals Belonging to Overseas Research Institutions

For a Future ASEAN IVO Project

- Interested members can conduct related research at NICT
- Work on data preparation, LLM training/evaluation of ASEAN languages

Thanks for Your Kind Attention