SUT
SEATUC2023 | The 17th South East Asian Technical University Consortium
"Empowering Communities through Innovative Engineering, Science and Technology"

Development of Discussion and Progress State Visualization System to Support Project-based Learning

Background and Objective

- Project-Based Learning (PBL) refers to a learning method in which the students find various issues independently and acquire the ability to solve them.
- Due to the COVID-19 pandemic, the need for online learning support has increased.
- To build a discussion visualization system that can support students and teachers from two aspects
  - (1) Individual Speech Analysis
  - (2) Discussion Status Estimation

Previous Research

- A visualization system with comprehensive discussion analysis data that feeds back the results in real-time(Fig.1).
- Problem:

Low accuracy of analysis due to lower utterances

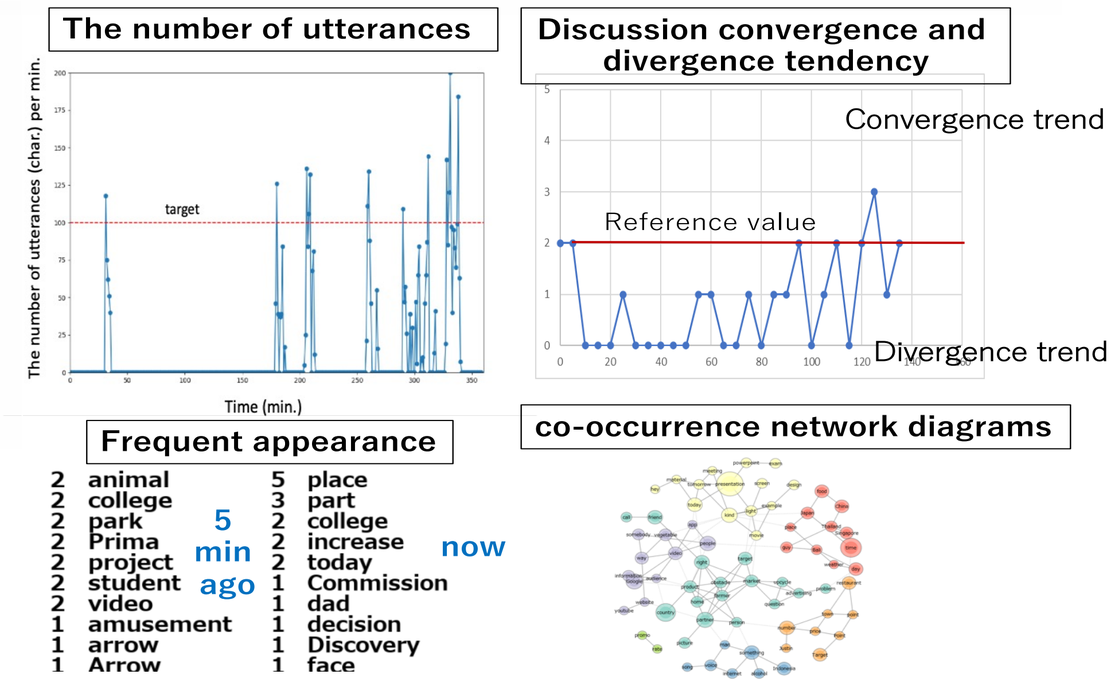

Fig. 1 The analysis results by previous research [1]

Proposed Method

- (1)Calculation of the amount of speech and contribution of each speaker per 1min(Fig.2).
- (2)A model to speculate on the progress of the discussion into 4 steps by Naive Bayes classifier.

①Role-sharing ②Confirmation of Status quo
③Brainstorming ④Summary

Students can grasp the information of the discussion in real time, and let students speak actively.
Teachers can use these results to judge whether the student's discussion is progressing and support them promptly.

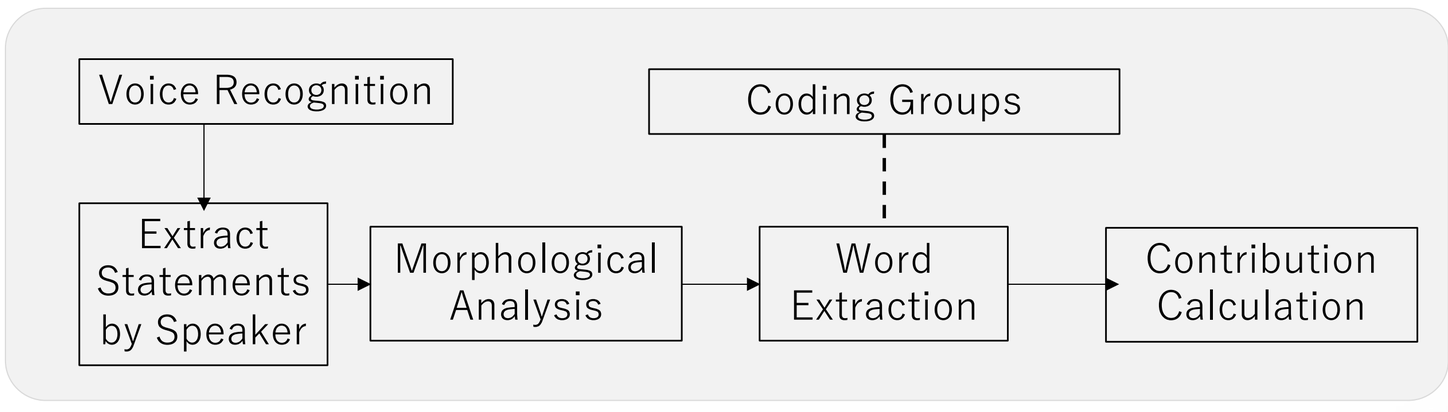

Fig.2 The Flow of calculating individual contribution score

Experiments

Purpose : To verify the accuracy and correctness of the two functions added this time.

(1)Individual Speech Analysis(Fig.3)

Speaker 3 performed the best.
Consistent with the realistic results.

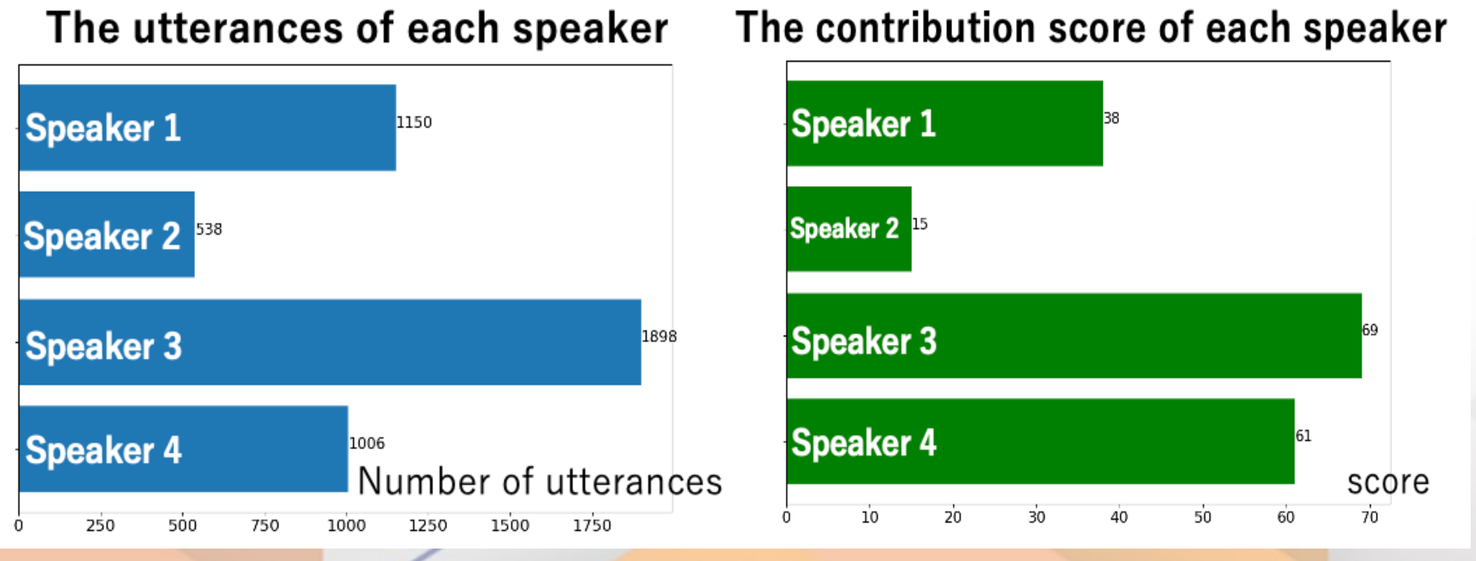

Fig.3 The result of Individual Speech Analysis

(2)Discussion Status Estimation(Table.1)

Training data :13 pieces of discussion data of 15~20 mins
Experimental data : 5 discussion data of 15~20 mins

Table.1 Percentage of Correct Discussion Status Estimates
(Number of Correct/Execution Count)

Test Data	Voice Recognition	Manual Transcription	
	5min	3min	5min
1	4/5	/	4/4
2	5/7	5/7	4/4
3	5/6	5/6	3/4
4	3/6	4/5	3/3
5	6/7	2/3	4/4

Conclusion and Future Work

- Implemented discussion situation estimation and individual speech analysis.
- The discussion situation estimation and the individual utterance analysis are practical.
- To improve the accuracy of the system's analysis in order to support the system in production.

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Reference

[1] Kana Matsuhisa, Ying Mu, Masahiro Inoue, Taketoshi Yokemura, Kazunori Mano, "Discussion Visualization and Reflection System to Facilitate Team-Based Learning", SEFI Annual Conference 2021