Devlopment of an AI speaker based Mood Disorder Diagnosis Service

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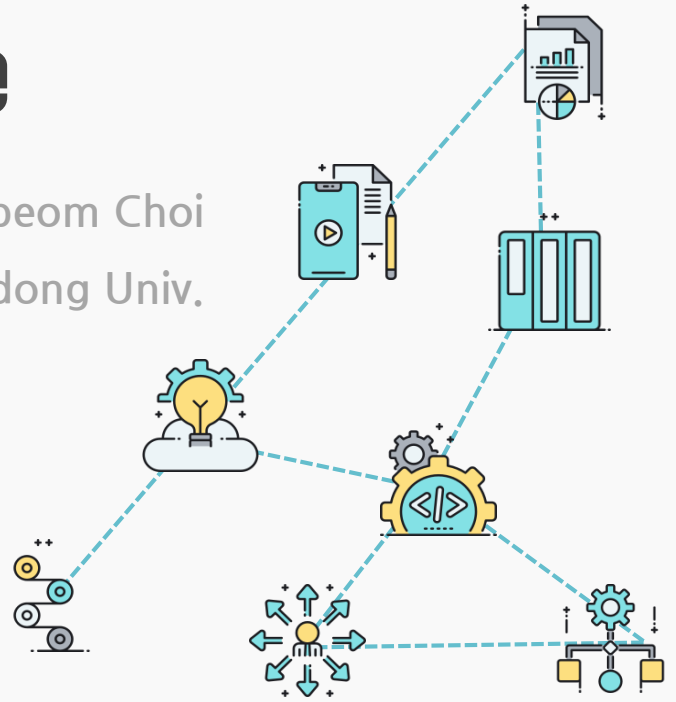
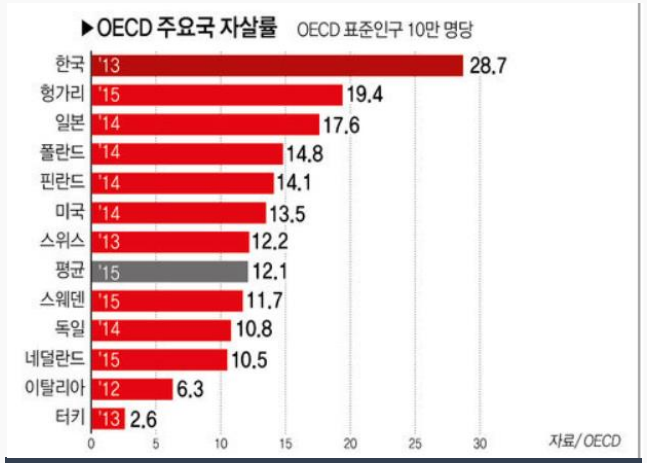


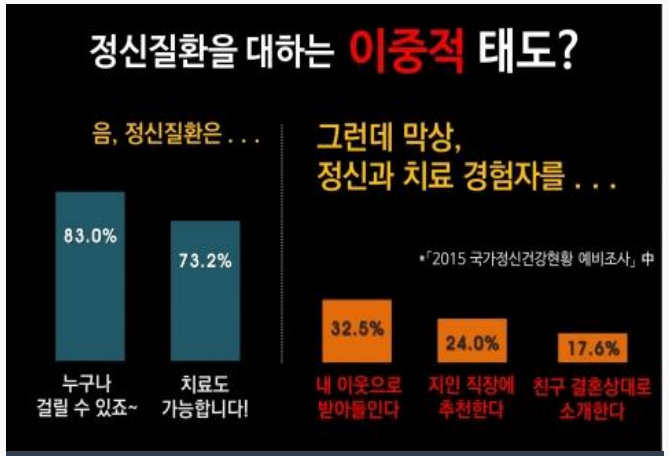
I. Research Backgrounds



Suicide Rate in major OECD countries

High Suicide Rate of Koreans

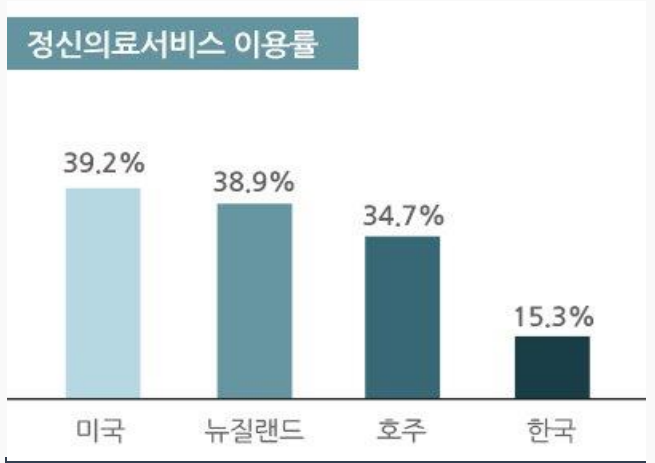
South Korea's suicide rate is consistently the highest among major OECD countries.



Survey of Koreans;s attitude toward mental illness.

Fear of being judged as mental illness.

Tendency not to expose psychological problems because of fear of being branded as having psychological problems.



Comparison of the Utilization of Psychological Counseling Service

Poor utilization rate of psychotherapy services

The utilization rate of mental health services in Korea is only 15.3 percent, less than half of what the United States, New Zealand and Australia have.

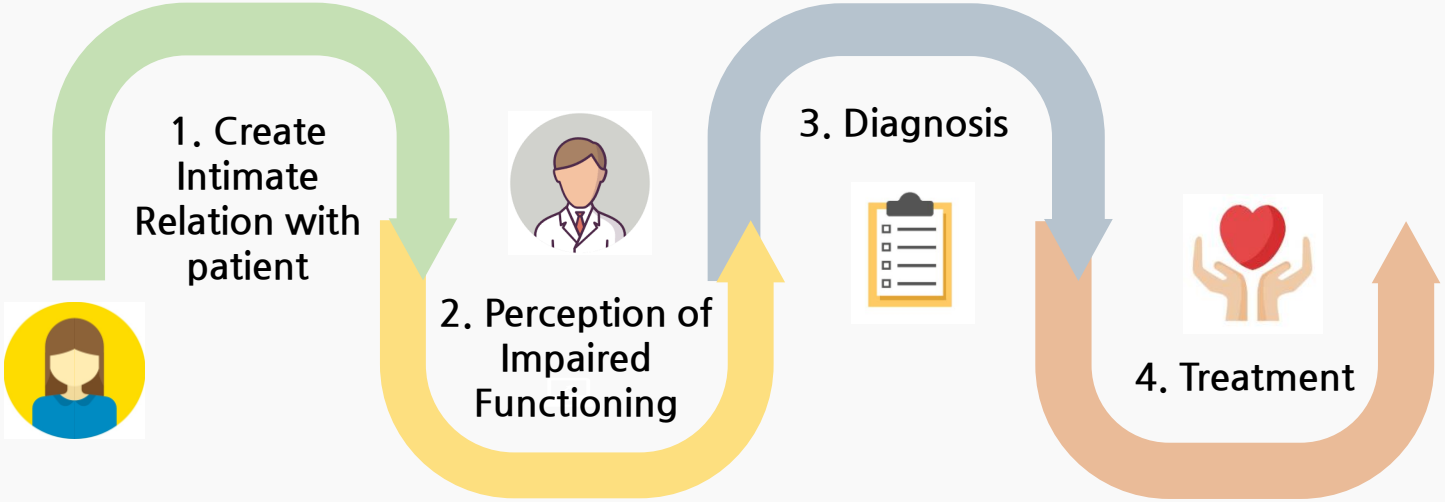
The Need for Complementary Psychological Consultation and Inspection Services

I. Research Backgrounds

Psychological Counseling

Forming a therapeutic help relationship through the process of interaction between a patient and a counselor in order to solve the difficulties caused by psychological problems in daily life.

Traditional Person-Person System in Psychological Counseling

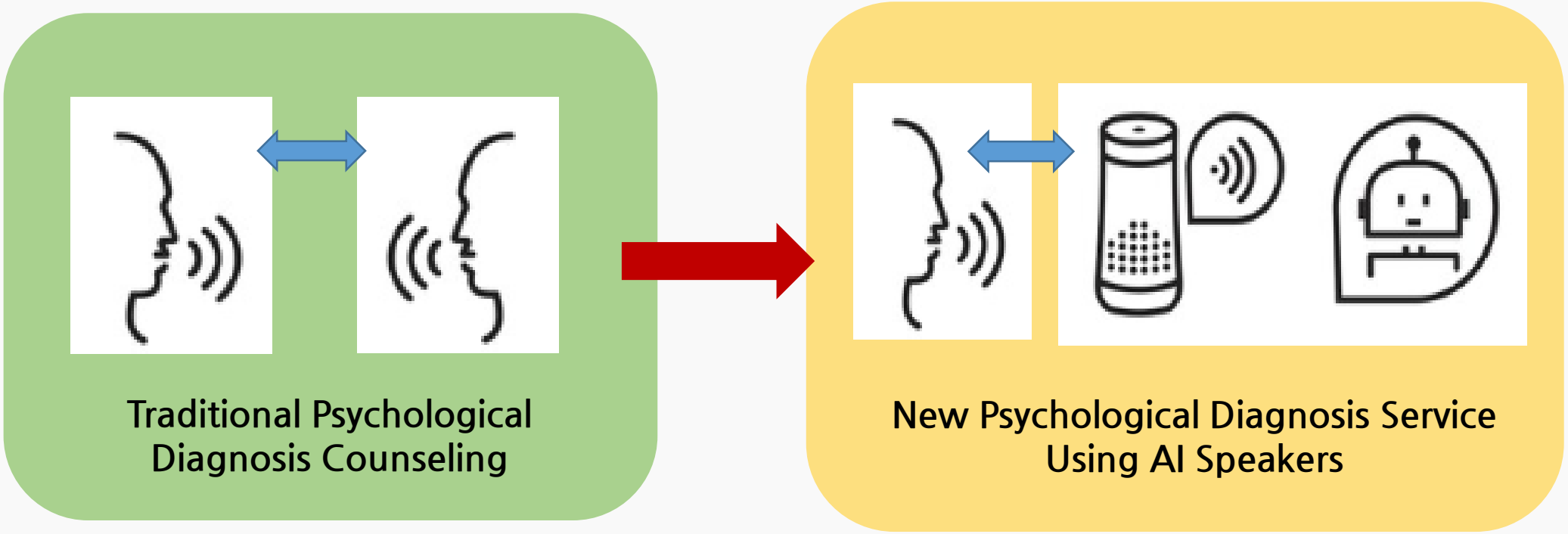


Psychological conseling procedes through face-to-face verbal interaction

I. Research Backgrounds

AI Speaker

Artificial Intelligence Speakers use artificial intelligence to communicate with users by voice, and as data continues to accumulate through deep learning algorithms with voice recognition technologies, natural conversation is possible based on this.



II. Related Research

Text-based diagnostic model: Korean language analysis program (KLWC)

[이창환, 심정미, 윤애선. (2005). 언어적 특성을 이용한 '심리학적 한국어 글분석 프로그램(KLIWC)' 개발 과정에 대한 고찰. 인지과학, 16(2), 93-121.]

- ✓ Korean Language Analysis Program Translated by Psychologists and Linguists
- ✓ Calculate the percentage of words related to emotion and desire by analyzing the verbal form of a given text
- ✓ Analysis of language analysis programs between groups with psychological disabilities and normal groups revealed significant differences between groups
- ✓ In particular, 76% of the diagnosis of mood disorders, such as depression, was most accurate.

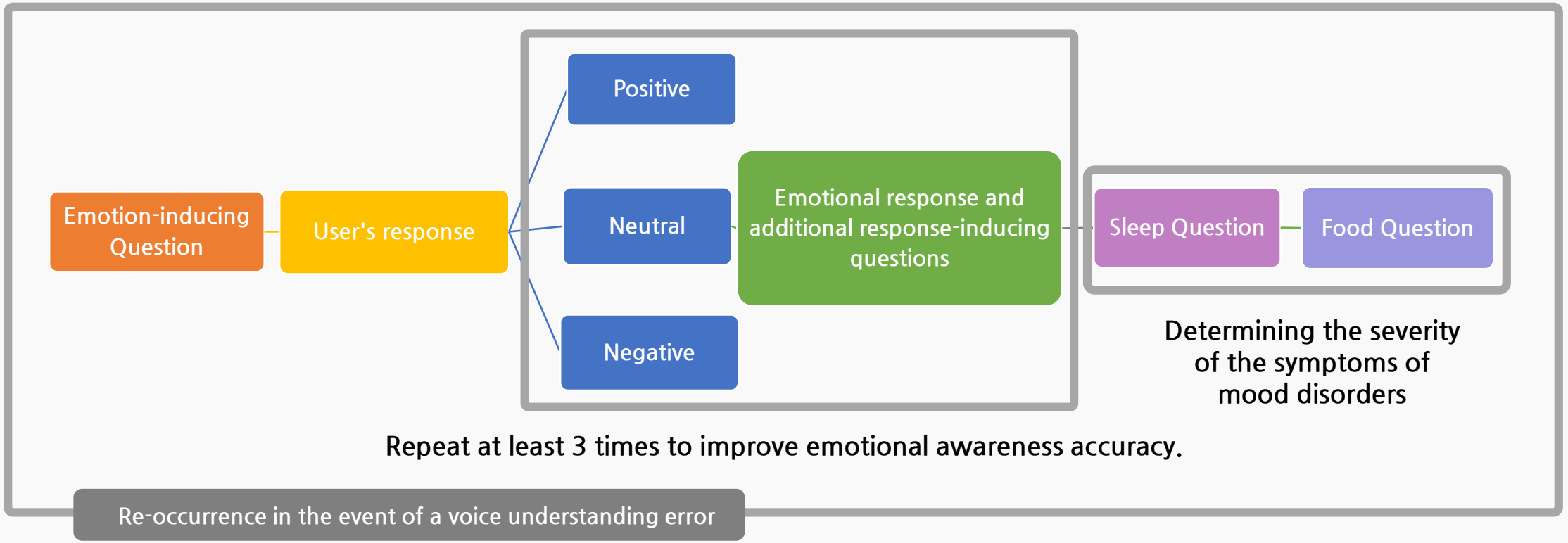
Demonstrate the possibility of psychological diagnosis and outcome assessment using text data

Does not take into account the context of ongoing dialogue, and there is a possibility that the shorter length of the text will significantly reduce the accuracy.

III. AI speaker based Mood Disorder Diagnosis Service

AI speaker-based psycho-diagnostic service algorithm

- Continuous psycho-diagnosis service that identifies current emotional state according to context
- The open discourse structure in question format elicits a natural expression of emotion, and the agent provides an appropriate emotional response.



IV. Rearch Methodology

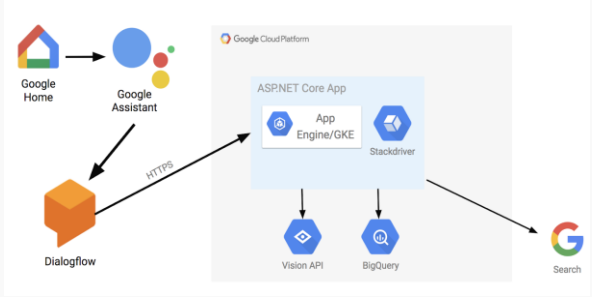
1. AI speaker chatbot for emotional interaction

- Extract the user's response text based on the AI speaker's questions

  1) Emotional Response-Driven Questions for Virtual Counselor Agents

  2) Extract the user's response text

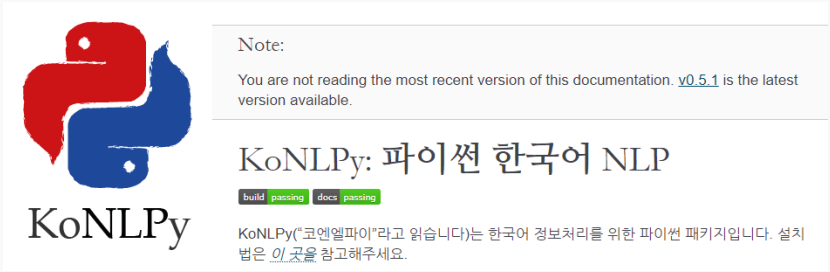
  With **Google Assistant Dialogflow**



2. Response Text Natural Language Processing

- Separate the user's response text into individual morphemes and adornments
- Python-based Natural Language Handler **Konlpy** Module

  - It has the advantage of quickly grasping the structure of various linguistic attributes of a given text and automatically connecting the adverbs to take into account the meaning and context of the morpheme.



IV. Rearch Methodology

3. Korean Sentiment Dictionary

- Compare the text data of users separated by morphemes with Korean emotional dictionaries to derive results.

1) KOSAC Korean Sentiment Dictionary (http://word.snu.ac.kr/kosac/)
2) KNU Korean Sentiment Dictionary

- Analyze the meaning of each word that constitutes a standard Korean dictionary to extract positive negatives.
- Composed of universal positive negatives that can be used in any domain

NGRAM	NEG	POS
부당/XR;하/XSA;ㄴ/ETM	-2	0
힘차/VA;게/EC;진행/NNG;되/XSV;는/ETM	0	2
가누/VV;지/EC;못하/VX;ㄹ/ETM;정도/NNG;로/JKB	-2	0

4. Storing psychoanalytical data

- Store analysis results for future use as a psychological support material
  - **Google Spread Sheet**

IV. Rearch Methodology

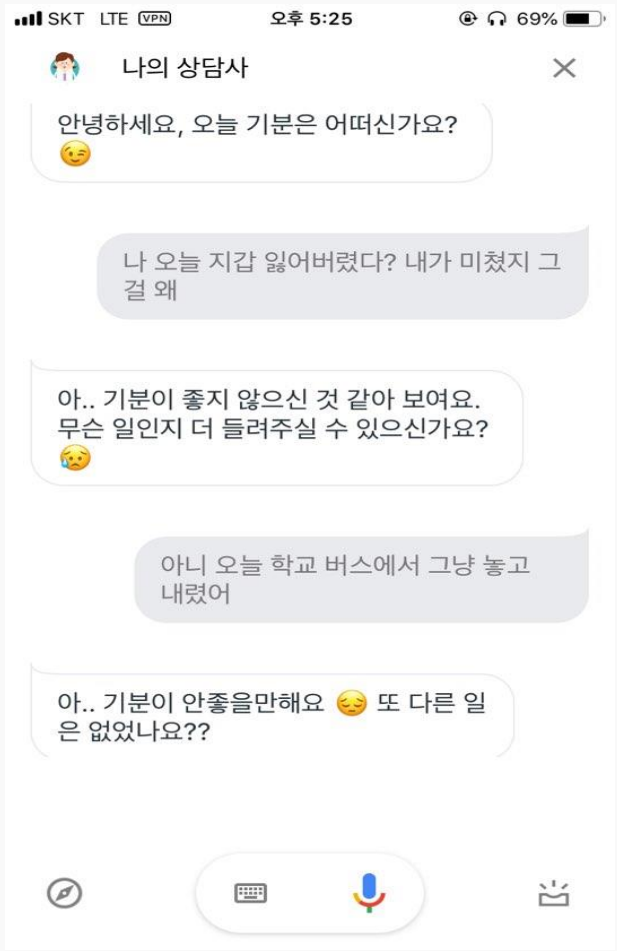
5. Analysis of Sleep and Eating Questions

[현대 한국어 정도부사의 사용양상과 그 분류-세종말뭉치 문어자료를 이용한 2원 네트워크 분석, 정성훈]

- Identify the severity of sleep/eating disorders, a typical symptom of mood disorders, by analyzing the precision in the user's responses
  1) **positive/negative identification**
  2) **a high degree of precision**
     - ✓ In case of a negative answer, the adverb with a high degree of precision is measured in reverse
  3) **Recognize numbers in text when specific times have been answered**
     - ✓ 9+ hours of sleep is another sign of depression and is negatively judged.

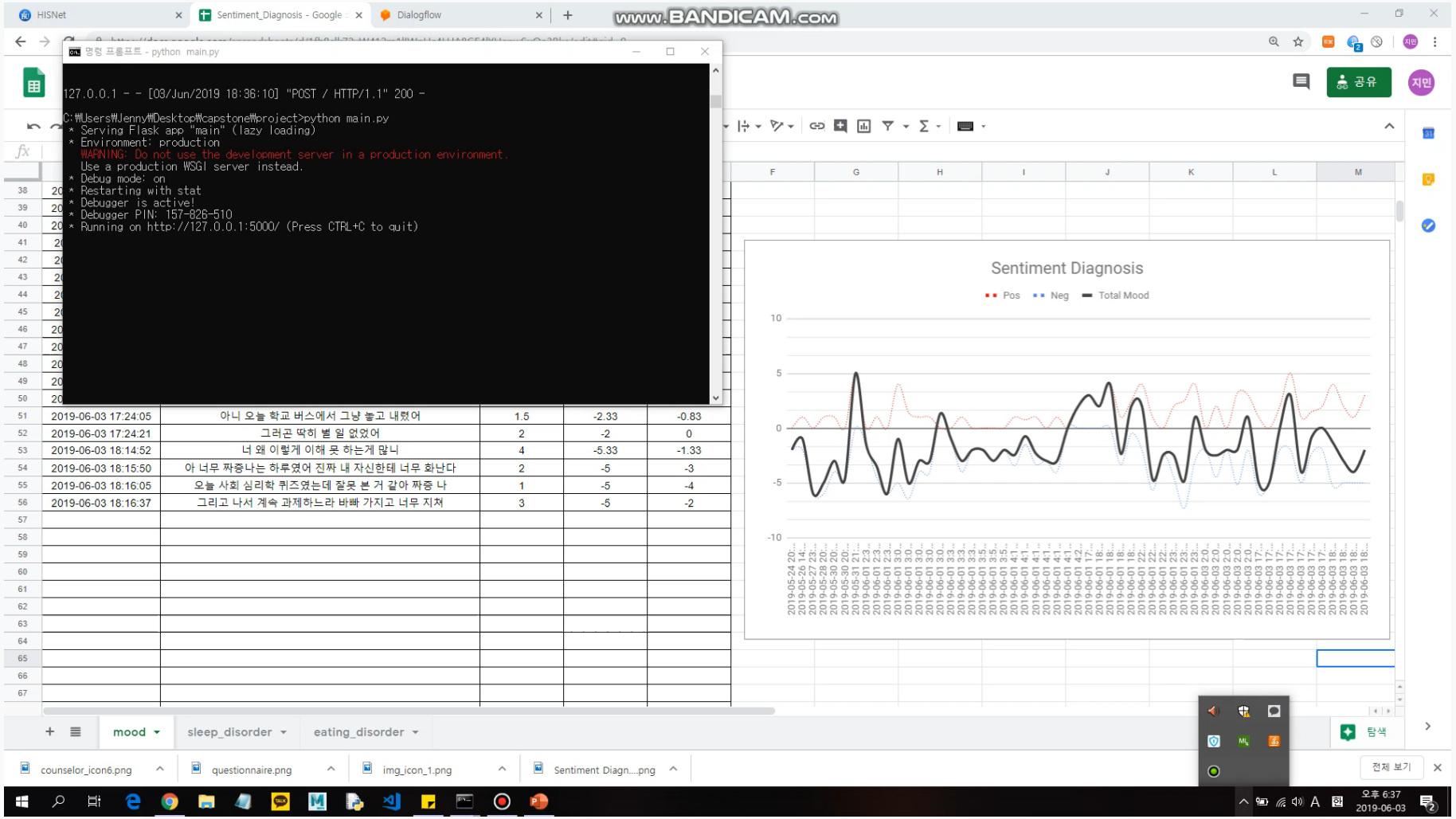
V. Current Progress

SIMULATION SERVICE PROTOCOL PROTOCOL: Google Assistant App



V. Current Progress

심리 진단 서비스 프로토타입: AI 스피커를 통한 서비스 실행 동영상

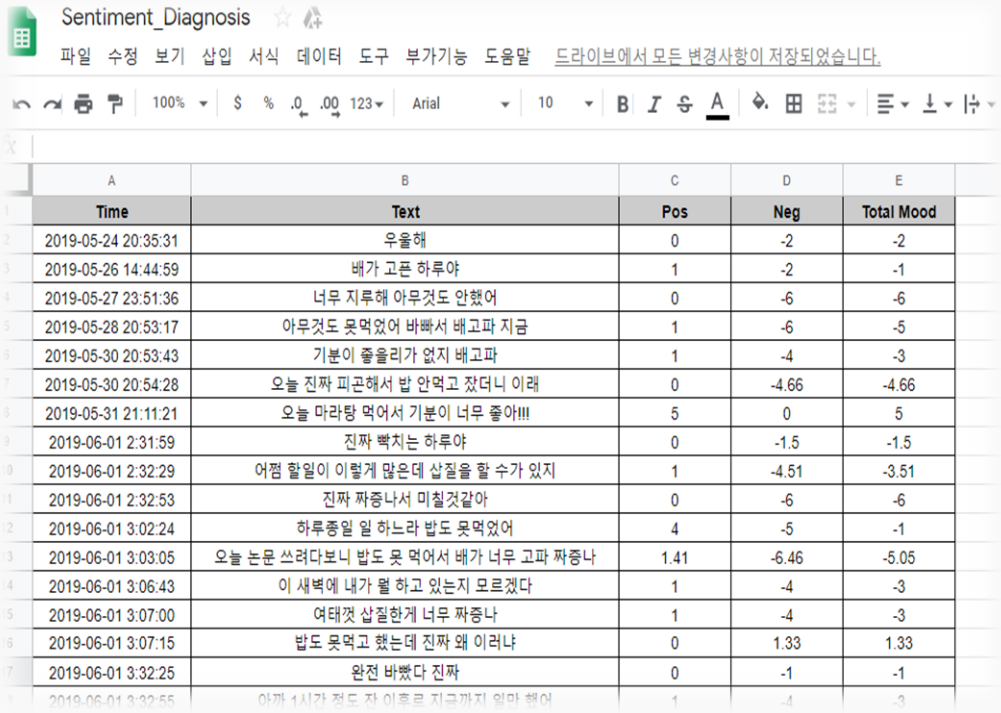


V. Current Progress

심리 진단 서비스 데이터 저장

https://docs.google.com/spreadsheets/d/1fh8clk72yW412m1lIWnHc4LUA8GF4lYHanwSuQe3Bkc/edit#gid=0

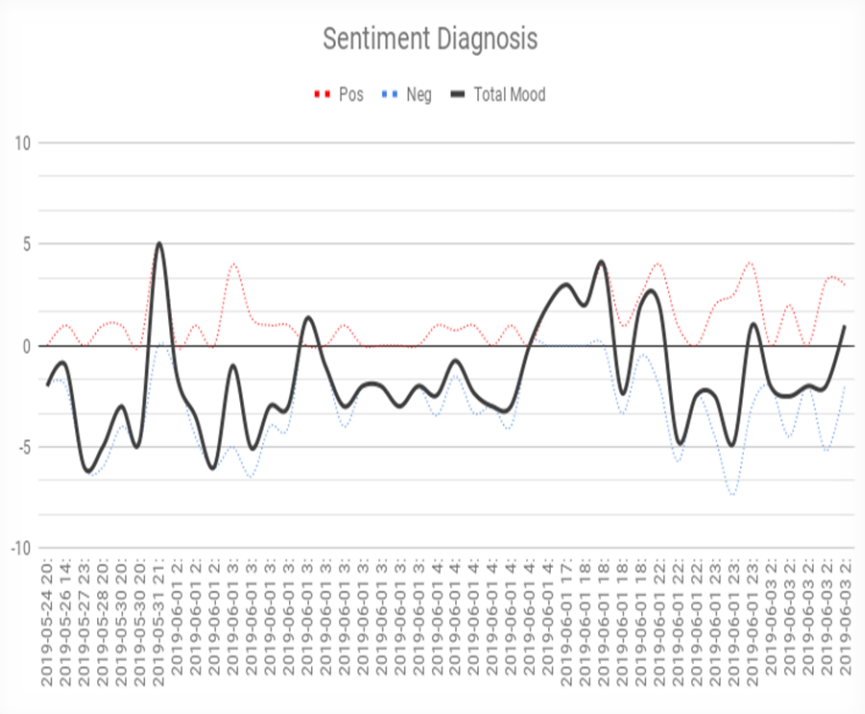
- 텍스트 전달 시, 구글 스프레드 시트에 자동적으로 입력, 그래프는 즉각적으로 이를 표현함
- 일상생활에서 보이는 감정 변화는 대략 -5~5 사이를 오감
- 추가 연구를 통해 정신병리적 기분변화 추이 분석 예정


Sentiment_Diagnosis

파일 수정 보기 삽입 서식 데이터 도구 부가기능 도움말 드라이브에서 모든 변경사항이 저장되었습니다.

	A	B	C	D	E
1	Time	Text	Pos	Neg	Total Mood
2	2019-05-24 20:35:31	우울해	0	-2	-2
3	2019-05-26 14:44:59	배가 고픈 하루야	1	-2	-1
4	2019-05-27 23:51:36	너무 지루해 아무것도 안했어	0	-6	-6
5	2019-05-28 20:53:17	아무것도 못먹었어 바빠서 배고파 지금	1	-6	-5
6	2019-05-30 20:53:43	기분이 좋을리가 없지 배고파	1	-4	-3
7	2019-05-30 20:54:28	오늘 진짜 피곤해서 밥 안먹고 잤더니 이래	0	-4.66	-4.66
8	2019-05-31 21:11:21	오늘 마라탕 먹어서 기분이 너무 좋아!!!	5	0	5
9	2019-06-01 2:31:59	진짜 빡치는 하루야	0	-1.5	-1.5
10	2019-06-01 2:32:29	어쩜 할일이 이렇게 많은데 삽질을 할 수가 있지	1	-4.51	-3.51
11	2019-06-01 2:32:53	진짜 짜증나서 미칠것같아	0	-6	-6
12	2019-06-01 3:02:24	하루종일 일 하느라 밥도 못먹었어	4	-5	-1
13	2019-06-01 3:03:05	오늘 논문 쓰려다보니 밥도 못 먹어서 배가 너무 고파 짜증나	1.41	-6.46	-5.05
14	2019-06-01 3:06:43	이 새벽에 내가 뭘 하고 있는지 모르겠다	1	-4	-3
15	2019-06-01 3:07:00	여태껏 삽질한게 너무 짜증나	1	-4	-3
16	2019-06-01 3:07:15	밥도 못먹고 했는데 진짜 왜 이러냐	0	1.33	1.33
17	2019-06-01 3:32:25	완전 바뻤다 진짜	0	-1	-1

응답 시간, 텍스트, 감정 값 저장



시간에 따른 감정 변화 그래프

VI. Conclusion and Futher Study

Conclusion

- AI based Mood disorder diagnosis service is proposed to
  - ① Reduce the time/space/cost limit of the existing psycho-diagnostic service
  - ② available on its own house and does not subject to social attention

- Just as medical professionals, demonstrated the potential to diagnose mood disorders through user responses obtained through speech recognition.
- Possibility of using subsequent service-accumulated conversational history as medical assistance data

Further Study

- Need to obtain and analyze data on service use of actual mental patients
- Algorithm considering user's language patterns is expected to be necessary

Q&A