# AI를 활용한 모의면접 프로그램 (Final report)

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# 프로그램 소개

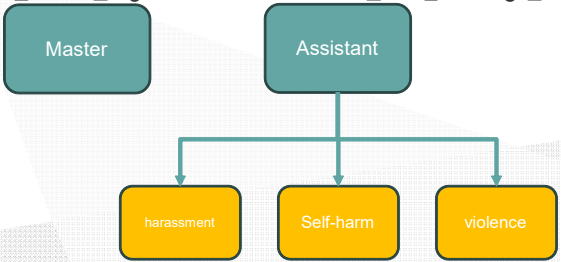
- 목적 : 다양한 상황, 또는 topic에 대한 면접준비에 도움을 줄 수 있는 모의면접 시뮬레이션 제공 -> 면접 합격률 상승
- 기능 : 질문을 만들고 해당 질문에 대한 답변을 받음 -> 답변에 대한 comment(피드백) 제공
- AI 활용 : 다양한 면접 질문 생성에 활용, 답변 첨삭(피드백)에 사용, 답변이 인성적인 부분에서 critical한 miss가 없는지 확인하는데 사용

# 프로그램의 직관적 이해(상황 비유)

- 면접관 1명(master_interviewer)과 모의면접 진행
- 면접에서 질문의 topic 지정 가능
- 면접관이 질문을 하면 이에 대한 답변을 입력(꼬리질문 있음)
- 면접관은 답변에 대한 첨삭(comment)를 작성
- 면접이 끝난 후 assistant(~~_interviewer)들과 피드백 진행
- assistant들은 comment + 인성 평가항목에서 critical한 부분이 있었는지를 알려줌

# OOP Concepts

- Encapsulation : 면접 질문 생성, 사용자 답변 저장, 평가 등을 담당하는 Master class , 면접에 직접적으로 참가하지 않고 답변의 인성적인 측면을 평가하는 assistant class 생성, 역할을 수행할 수 있게 member variable, function 설정.
- Inheritance : 인성 평가의 측면을 3가지로 구분, Assistant class를 parent class로 하여 3개의 child class를 생성.
- Polymorphism : child class는 같은 이름(check_pass, print_pass) 라는 같은 이름의 함수를 갖지만 다루는 평가 요소가 다르기 때문에 함수 내용은 다르다.



# OpenAI API 사용 1 (chat)

- Model: gpt-3.5-turbo
- Role : user
- Content : AI에게 면접 질문 생성, 답변 첨삭 요구

Example request gpt-3.5-turbo curl Copy

```
curl https://api.openai.com/v1/chat/completions \
  -H "Content-Type: application/json" \
  -H "Authorization: Bearer $OPENAI_API_KEY" \
  -d '{
    "model": "gpt-3.5-turbo",
    "messages": [
      {
        "role": "system",
        "content": "You are a helpful assistant."
      },
      {
        "role": "user",
        "content": "Hello!"
      }
    ]
  }'
```

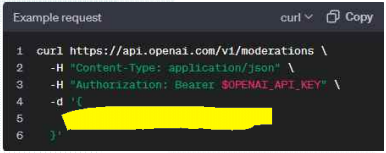
- Content : 면접 질문, 답변 첨삭 comment

Response Copy

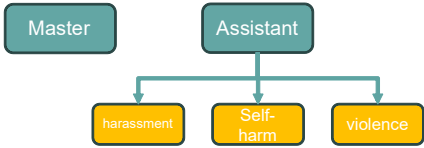
```
{
  "id": "chatcmpl-123",
  "object": "chat.completion",
  "created": 1677652288,
  "model": "gpt-3.5-turbo-0613",
  "system_fingerprint": "fp_44709d6fcb",
  "choices": [{
    "index": 0,
    "message": {
      "role": "assistant",
      "content": "\n\nHello there, how may I assist
    },
    "finish_reason": "stop"
  }],
  "usage": {
    "prompt_tokens": 9,
    "completion_tokens": 12,
    "total_tokens": 21
  }
}
```

# OpenAI API 사용 2 (moderation)

- input: moderation 평가 받을 내용
- Categories : 각 항목별 ai의 moderation 평가 결과 (harassment, self-harm, violence 활용




# Class 분석




- 종류 : master_interviewer, assistant_interviewer,
- master_inteviewer : AI와 소통하면서 질문을 만들어 user에게 질문, 그에 대한 user의 답변을 저장하고, 이 답변을 다시 AI에게 보내 comment를 받아오는 면접관 역할
- Assistant_interviewer : (harassment, self-harm, violence) 3 종류 child class 존재. 항목별 member function이 조금씩 다른 것들을 overriding, polymorphism을 통해 구현 oop개념 적용.

# Class 분석(master_interviewer : member variable(or object)

◆ vector<string> question, ans, comment

- 만든 질문, 얻은 답변, 답변에 대한 comment들을 저장
- 질문 총 갯수가 랜덤이라 vector로 저장

◆ vector<string> topic_list

- 면접에 사용할 topic을 저장
- topic 갯수, 종류 인풋으로 받을 수 있어 크기 고정되어 있지 않아 vector로 저장

◆ vector<bool> topic_done

- 면접에서 해당 topic을 사용했는지 확인하는데 사용

◆ int topic_num

- topic을 user가 임의로 지정할 때, 몇 개의 topic을 받을 것인지 인지하는데 사용

# Class 분석(master_interviewer : member function)

◆ do_interview()
- 인터뷰를 진행하는 함수. 다른 member function들로 구성

◆ set_topic()
- 면접에 사용할 topic 세팅하는 함수. default or 인풋을 받아 특정 topic 질문 받을 수 있음

◆ make_topic_question()
- AI를 활용해 특정 topic 관련된(or 랜덤) 면접 질문 생성, 저장

◆ make_tail_question()
- AI에게 앞서 있었던 질문과 답변을 전달해 꼬리 질문을 생성, 저장

◆ make_comment()
- 답변에 대한 comment를 생성, 저장

◆ feedback()

◆ - comment && 인성 평가항목에서 critical한 부분이 있었는지를 출력

# Class 분석(assistant_interviewer)

◆ 용도

- child class를 만들어 pholymorphism을 활용하기 위한 class

◆ child class

- 답변이 특정 인성항목에서 critical하게 위배되진 않는지 확인하는 면접 assistant 역할

◆ member variable(object)

- vector<bool> pass : protected로 child class 접근 가능. 특정 인성항목에 critical하게 위배되지 않는지를 저장

◆ member function(virtual)

- check_pass : 답변이 pass인지 아닌지 확인하고 값 저장
- print_pass : pass 값에 따른 피드백 출력
- destructor

# Class 분석((인성항목)_interviewer)

◆ 종류

- 답변이 특정 인성항목에서 critical하게 위배되진 않는지 확인하는 면접 assistant 역할로 harassment, self_harm, violence를 확인하는 class들로 총 3개가 있다.

◆ overrided member function

- check_pass : 답변이 해당 인성항목에서 pass인지 아닌지 확인하고 값 저장
- print_pass : pass 값에 따른 피드백 출력
- destructor

# main() 분석

```
main(){
        srand(time(NULL));//rand()를 위한 seed값 설정
        assistant_interviewer* assistant[3];//인성면접관들 = assistants
        assistant[0] = new harassment_interviewer();
        assistant[1] = new self_harm_interviewer();
        assistant[2] = new violence_interviewer();
        master_interviewer KK;//질문 만들고 comment 만드는 면접관
        KK.do_interview(assistant);//interview 실행
        delete assistant[0];
        delete assistant[1];
        delete assistant[2];
        return 0;
}
```

# 코드분석(do_interview(interview* assistant[]))

do_interview(assistant)
1. 인사말 출력
2. topic_list 받기 or default topic_list 저장 : set_topic();
3. 토픽에 대한 질문(for문)
3-1. 질문 만들고 출력 : make_topic_question();
3-2. 답변 받기
3-3. comment 만들기 : make_comment();
3-4. rand()%3로 해당 토픽**에서의** 꼬리질문 횟수 결정
3-5. 꼬리질문 만들고(for문) 출력 : make_tail_question();
3-6. 답변 받기 :
3-7. comment 만들기 : make_comment();
4. 피드백 하기 : feedback(assistant);
5. 마무리말 출력

# 코드분석(do_interview(interview* assistant[]))

```
void do_interview(interviewer* assistant[]){//모의면접 실행 함수
	std::cout << "Hello. This is a mock interview program to prepare for Samsung Electronics' executive interview.\nI hope this program will help you prepare for the interview.\n\n";//인삿말 출력
	set_topic();//면접에 사용할 topic 세팅(default or 자율적으로 세팅) : topic_list, topic_num 설정
	for(int i = 0; i <= topic_num; i++){//질문-답변받기-comment 작성
		make_topic_question(i);//토픽 첫 질문 만들기 : 질문 만들고 question에 push_back(), topic_done 갱신
		std::cout << question[question.size() - 1] << std::endl;//토픽 질문 출력
		std::string a;//질문 답변 입력받고 ans에 저장
		std::getline(cin, a);
		ans.push_back(a);
		make_comment()//답변에 대한 comment 만들기

		int tail_num = rand() % 3;//꼬리 질문 갯수
		for(int j = 0; j < tail_num; j++)
			make_tail_question();//꼬리 질문 만들기 : 질문 만들고 question에 push back()
			std::cout << question[question.size() - 1] << std::endl;//꼬리 질문 출력
			std::string a;//질문 답변 입력받고 ans에 저장
			std::getline(cin, a);
			ans.push_back(a);
			make_comment()//답변에 대한 comment 만들기
		}
	}
	feedback(assistant);//피드백 받기
	std::cout << "\n\nNow, the mock interview is over. I hope this mock interview helped you prepare for your interview. Goodbye~";//마무리말 출력
}
```

# 코드분석(set_topic())

```
void set_topic(){
        cout << "Before we start the interview, write the number of topics you want to set for the interview. For default topics, '0' is
fine.\n";

        cin >> topic_num;//입력할 토픽 갯수. 0이면 default topic
        getchar();
        if(topic_num == 0){//default topic 세팅
                topic_list.push_back("job-related knowledge");
                topic_list.push_back("job-related competencies");
                topic_list.push_back("problem-solving ability");
                topic_list.push_back("decision-making ability");
                topic_list.push_back("leadership skills");
                topic_list.push_back("communication skills");
                topic_list.push_back("global competence");
                topic_num = 7;
        }
        else{//topic 입력받기
                for(int i = 0; i < topic_num; i++){
                        std::cout << "write '" << i+1 << "'th topic : ";
                        std::string t;
                        std::getline(cin,t);
                        topic_list.push_back(t);
                }

        }//topic_done 초기화
        for(int i = 0; i < topic_num; i++){
                topic_done.push_back(false);
        }

}
```

# 코드분석(make_topic_question())

```
void make_topic_question(int i){
        openai::start(); //
        int topic_index = rand() % topic_num;//질문할 topic 고르기
        std::string topic;
        if(topic_done[topic_index]){//이미 사용했던 주제가 걸리면 랜덤 topic
                topic = ".";
        }
        else{
                topic = " about '" + topic_list[topic_index] + "'.";
        }
        if(i == 0){//첫 토픽은 자기소개
                question.push_back("Can you introduce yourself?");
        }
        else{//string의 '+' operation을 통해 AI에게 질문 요청할 요구문을 q에 저장
                string q = "You are an executive interviewer at Samsung Electronics. Ask the interviewee a question" + topic;
                json quest;
                quest["messages"][0]["content"] = q;
                quest["messages"][0]["role"] = "user";
                quest["model"] = "gpt-3.5-turbo";
                quest["temperature"] = 1;
                auto chat = openai::chat().create(quest);
                q = chat["choices"][0]["message"]["content"].template get<std::string>();

                question.push_back(q);//AI에게 받아온 질문을 question에 저장
                topic_done[topic_index] = 1;
        }
}
```

# 코드분석(make_tail_question())

```
void make_tail_question(){
        openai::start();//string의 '+' operation을 통해 AI에게 질문 요청할 요구문 q에 이전의 질문과 답변을 넣은 후, 다음 질문 무엇인지 요구
        string q = "In an executive interview with Samsung Electronics, I heard the question '" + question[question.size() - 1] + "', and I
answered '" + ans[ans.size() - 1] + "'. Ask me one next question.";
        json quest;
        quest["messages"][0]["content"] = q;
        quest["messages"][0]["role"] = "user";
        quest["model"] = "gpt-3.5-turbo";
        quest["temperature"] = 1;
        auto chat = openai::chat().create(quest);
        q = chat["choices"][0]["message"]["content"].template get<std::string>();
        question.push_back(q);//받아온 질문 question에 저장
}
```

# 코드분석(make_comment())

```
void make_comment(){
        openai::start();//string의 '+' operation을 통해 AI에게 받았던 질문과 답변을 전달하며 comment를 달라 요구
        string c = "In an executive interview with Samsung Electronics, I heard the question '" + question[question.size() - 1] + "', and I
answered '" + ans[ans.size() - 1] + "'. What do you think this answer is out of 100 and why? Reply me less than four sentences.";
        json quest;
        quest["messages"][0]["content"] = c;
        quest["messages"][0]["role"] = "user";
        quest["model"] = "gpt-3.5-turbo";
        quest["temperature"] = 1;
        auto chat = openai::chat().create(quest);
        c = chat["choices"][0]["message"]["content"].template get<std::string>();
        comment.push_back(c);//받아온 comment comment에 저장
}
```

# 코드분석(feedback(interview* assistant[])

```
feedback(interviewer* assistant[]){//질문-답변-comment 출력 && assistant들이 critical한 인성항목에 위배되는 질문인지 아닌지 체크해줌
        for(int i = 0; i < question.size(); i++){
                std::cout << "Q. " << question[i] << std::endl << "A. " << ans[i] << "\n***Comment***\n" << comment[i] < std::endl;
                for(int j = 0; j < 3; j++){
                        assistant[j]->check_pass(ans[i]);
                        assstant[j]->print_pass();
                }
        }
}
```

# 코드분석(class assistant_interviewer)

```
class assistant_interviewer{
        public://overriding을 위한 virtual member function
                virtual ~assistant_interviewer(){};
                virtual void check_pass(string ans){};
                virtual void print_pass(int index){
                        if(pass[index]){
                                std::cout << "Your answer is safe in terms of harassment.\n";
                        }
                        else{
                                std::cout << "Your answer is not safe in terms of harassment. You must change your answer!\n";
                        }
                }


        protected://child class들의 접근 허용
                std::vector<bool> pass;
};
```

# 코드분석(class harassment_interviewer)

```
class harassment_interviewer: public assistant_interviewer{
        public:
                ~harassment_interviewer(){};
                void check_pass(string ans){//AI에게 답변을 보내 인성항목에 critical하게 위배되지 않는지를 vector<bool> pass에 저장
                        openai::start();
                        json answer;
                        answer["input"] = ans;
                        auto moderation = openai::moderation().create(answer);
                        auto response = moderation["results"][0]["categories"]["harassment"].template get<bool>();
                        if(response == true)
                                pass.push_back(false);
                        else
                                pass.push_back(true);
                }
                void print_pass(int index){//pass값에 따른 피드백 출력
                        if(pass[index]){
                                std::cout << "Your answer is safe in terms of harassment.\n";
                        }
                        else{
                                std::cout << "Your answer is not safe in terms of harassment. You must change your answer!\n";
                        }
                }
};
```

# Team member contribution

- 이동주 : OPENAI_API 구조를 파악해 AI와의 커뮤니케이션에서 input, output을 다양한 class, 자료형으로 사용할 수 있었음
- 박유빈 : 프로그램 알고리즘 구성, 알고리즘의 구체적인 코드 구현 방법
- 공동 : 코드 구현 과정에서 OOP의 개념을 적용한 코드 작성 방법 연구

```
Hello. This is a mock interview program to prepare for Samsung Electronics' executive interview.
I hope this program will help you prepare for the interview.

Before we start the interview, write the number of topics you want to set for the interview. For default topics, '0' is fine.
4
write '1'th topic : leadership
write '2'th topic : problem-solving ability
write '3'th topic : honesty
write '4'th topic : job-related knowledge


Can you introduce yourself?
Hello, I'm Yoo Bin Park, who applied to Samsung Electronics. I've always been responsible for my duties and tried my best to come up with the best results. I
 received a commendation letter for practicing it while serving in the center for the disabled. I studied how to grasp the psychology from the behavior of th
e center users and how to provide appropriate services for each situation by referring to the videos of experts, and based on this, I created a replacement t
raining manual. I was awarded a commendation for reducing the training period from 3 weeks to 2 weeks and improving the quality of my work. I've also learned
 how to apply knowledge as an idea while developing inventions periodically. I learned how to utilize various knowledge while exploring inventions, and based
 on this, I came up with various inventions such as a detachable zipper and a smart cane that detects a dot block. Samsung Electronics will also contribute t
o leading the system semiconductor market by developing a technique that improves the performance of system semiconductors by utilizing the ability to apply
 ideas raised through invention activities.


Can you tell me about your previous experience in the technology industry?
Sorry I don't have any


Can you please describe a situation in which you had to make an ethical decision and prioritize honesty above all other factors?
I think I am an ethical person. I think the best example of this is the reorganization of the work system when I was a social service worker. When I was a so
cial service worker, my successors did most of the work, so I thought that this was not right because the quality of the work was low, so I reorganized the w
ork system to divide the work equally.


Can you explain how you ensured fairness and transparency during the reorganization of the work system as a social service worker?
After reorganizing the system, we surveyed which system was better compared to the previous one. As a result, more people said that the changed system was be
tter, and I felt that it was better myself, so I was able to reorganize the system with confidence.


Can you share some specific steps you took to gather feedback and opinions from employees during the reorganization process?
First of all, I created a system reform plan based on my experience when I was a successor. After implementing this, I revised it after receiving feedback fr
om my successors. Through feedback, I was able to grasp areas that I did not consider, so a more effective reform plan could be made.
```

Q. Can you introduce yourself?
A. Hello, I'm Yoo Bin Park, who applied to Samsung Electronics. I've always been responsible for my duties and tried my best to come up with the best results. I received a commendation letter for practicing it while serving in the center for the disabled. I studied how to grasp the psychology from the behavior of the center users and how to provide appropriate services for each situation by referring to the videos of experts, and based on this, I created a replacement training manual. I was awarded a commendation for reducing the training period from 3 weeks to 2 weeks and improving the quality of my work. I've also learned how to apply knowledge as an idea while developing inventions periodically. I learned how to utilize various knowledge while exploring inventions, and based on this, I came up with various inventions such as a detachable zipper and a smart cane that detects a dot block. Samsung Electronics will also contribute to leading the system semiconductor market by developing a technique that improves the performance of system semiconductors by utilizing the ability to apply ideas raised through invention activities.
***Comment***
I would rate this answer around 85 out of 100. The candidate effectively introduces themselves and highlights their accomplishments and skills in various areas. They also mention their ability to apply knowledge creatively and their desire to contribute to Samsung Electronics. However, the answer could be improved by providing more specific examples of their work and achievements.
Your answer is safe in terms of harassment.
Your answer is safe in terms of self_harm.
Your answer is safe in terms of violence.


Q. Can you tell me about your previous experience in the technology industry?
A. Sorry I don't have any
***Comment***
I would rate this answer a 60 out of 100. While it is honest, it may not be ideal for a technology industry role. However, other factors such as qualifications, skills, and potential may still be considered by the interviewer. It is important to highlight any relevant transferrable skills and express enthusiasm for learning and adapting to the technology industry.
Your answer is safe in terms of harassment.
Your answer is safe in terms of self_harm.
Your answer is safe in terms of violence.


Q. Can you please describe a situation in which you had to make an ethical decision and prioritize honesty above all other factors?
A. I think I am an ethical person. I think the best example of this is the reorganization of the work system when I was a social service worker. When I was a social service worker, my successors did most of the work, so I thought that this was not right because the quality of the work was low, so I reorganized the work system to divide the work equally.
***Comment***
In my opinion, this answer would score around 70 out of 100. While the candidate acknowledges the need for ethical decision-making and describes a situation where they prioritized honesty and fairness, the example provided may not directly relate to the specific context of Samsung Electronics. Additionally, the answer could benefit from additional details and specific outcomes achieved through the candidate's reorganization efforts.
Your answer is safe in terms of harassment.
Your answer is safe in terms of self_harm.
Your answer is safe in terms of violence.

# URL

https://github.com/riz0628/2023_TEAM10_project