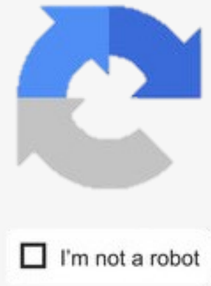
New **CAPTCHA** System

Designing AI-Based Multidimensional

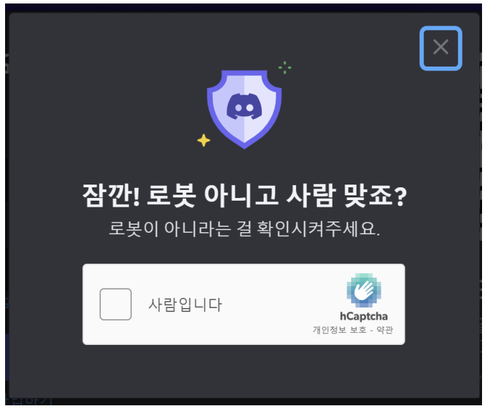
202035501 Kang Seungmin

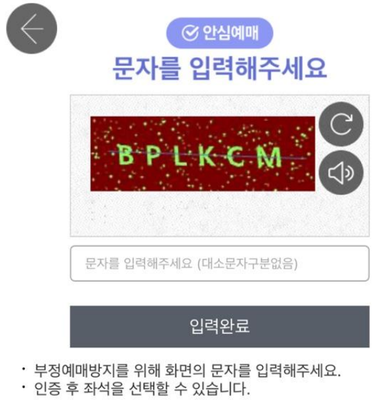
202035510 Kim Yoohyun

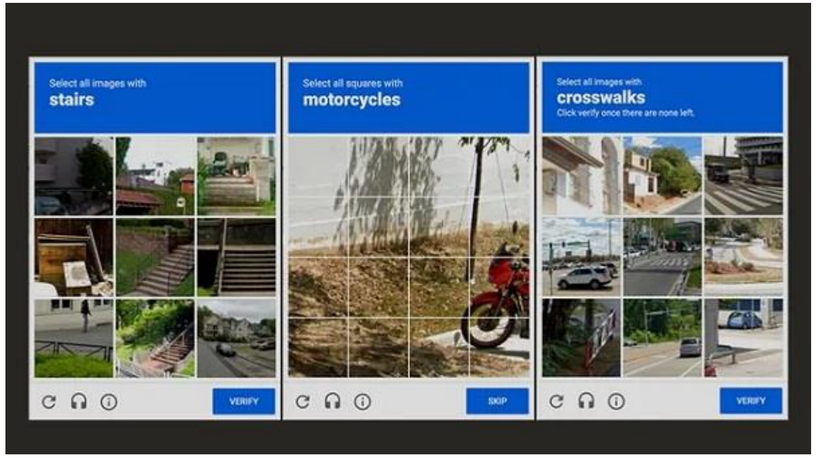
202035002 Kang Giwon



CHAPTER 01 Motivation







Bot exploits the website

Protecting Server Resources

Cut costs(Dual authentication) by blocking unnecessary authentication requests early

Scraping and automated data collection

CHAPTER **01 Motivation**

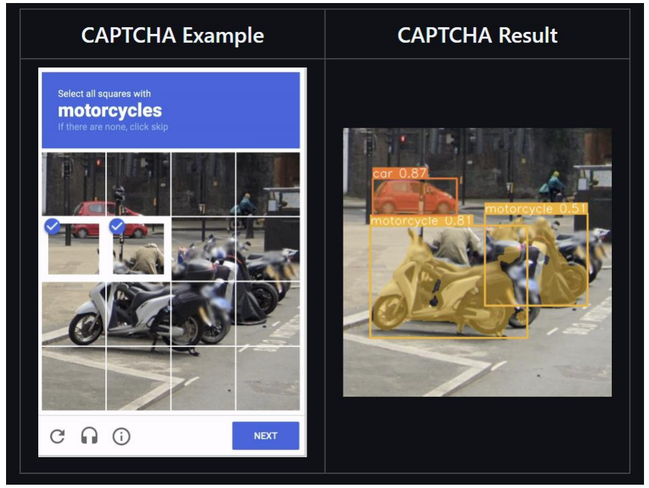
[An optimized system to solve text-based CAPTCHA]

11 Jun 2018

Fig. 11. The full process of defeating the CAPTCHA

[Breaking reCAPTCHAv2-yolov8]

13 Sep 2024



https://github.com/aplesner/Breaking-reCAPTCHAv2

[DMTG: A Human-Like Mouse Trajectory Generation Bot Based on Entropy-Controlled Diffusion Networks]

23 Oct 2024

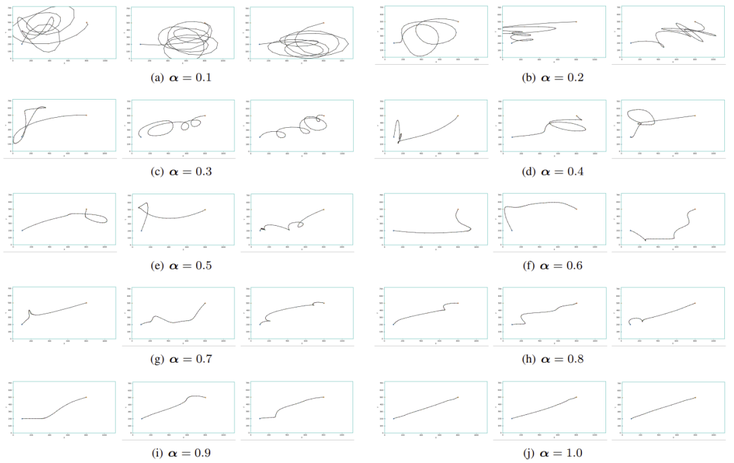


Figure 4. Examples of DMTG Curves under Different α Values in **Eq.** (10)

CHAPTER 02 Demonstration

Join web page

회원가입

이름:

이름을 입력하세요

생년월일:

년 - 월 - 일

아이디:

아이디를 입력하세요

중복 체크

비밀번호:

비밀번호를 입력하세요

6자리 이상 입력하세요!

비밀번호 확인:

비밀번호 확인

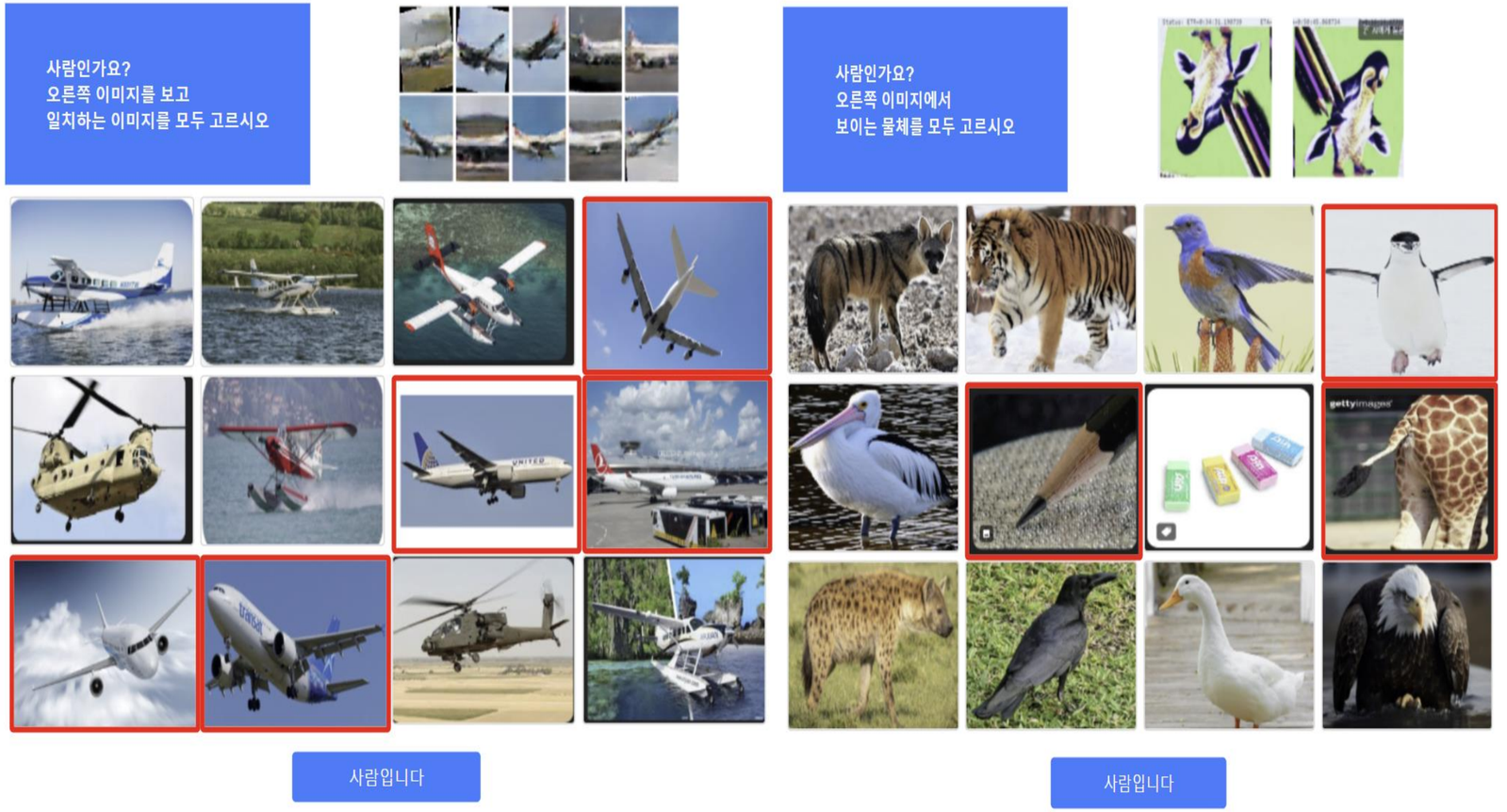
E-mail:

E-mail을 입력하세요

개인정보 활용에 동의합니다.

회원가입

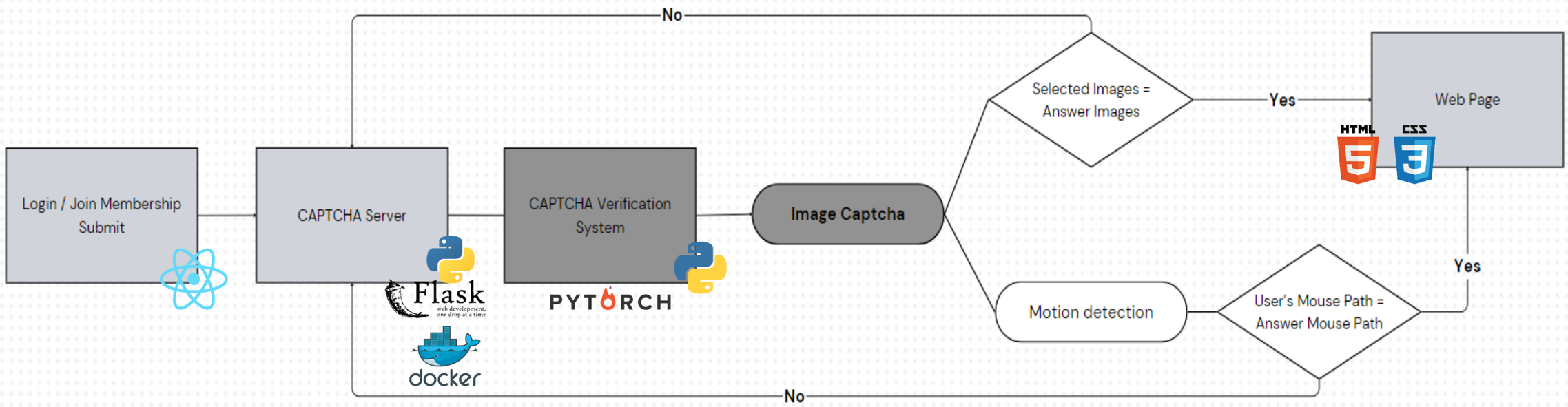
CAPTCHA (DCGANs)



CAPTCHA (Diffusion)

CHAPTER

03 Structure



CHAPTER 03 Structure

Main Page

For User (Developer)

CHAPTER

06 Technology

User Evaluation

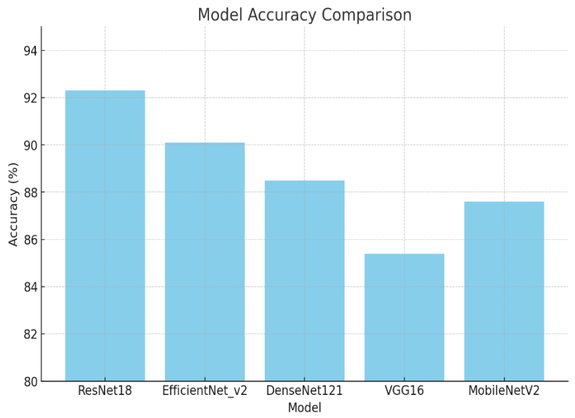
- **It should be recognizable to the user**
- **The user resolves the problem within 5~10 seconds**

Computer Evaluation

- **Pre – trained ResNet18**
- **Segmentation Model SAM**
- **Detection Model Yolov11**

Why use this model?

- **ResNet18**
  - **Best for 128x128 image datasets**



Weight Initialize

Weight Initialization	Image	Human Evaluate	Suitability
Random Init		인간이 이해하는 것 이해하지 못하는 이미지가 모여있다.	보류
Normal Distribution initilaize		인간 이해	적합
He initialization		인간 이해 불가능	부적합

Batch Shape

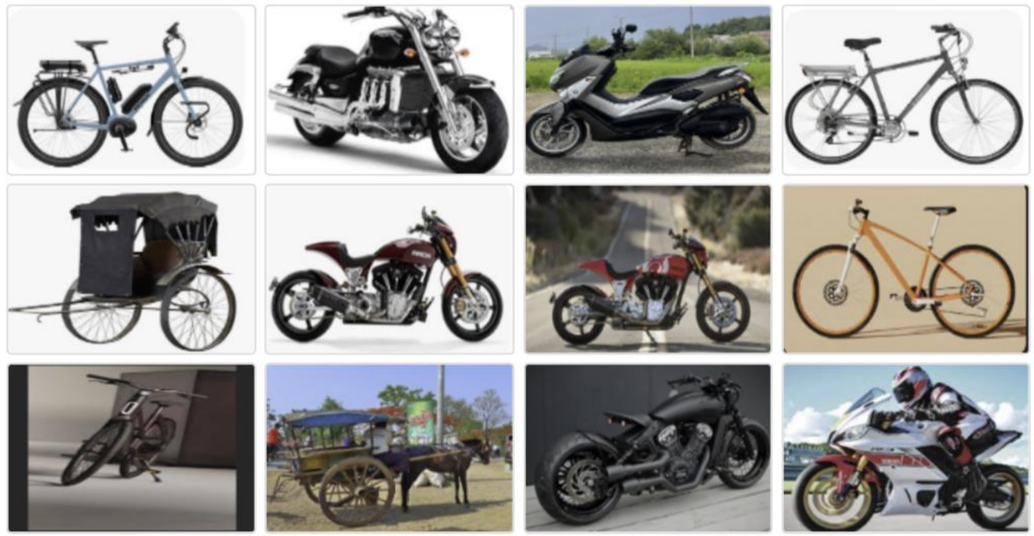
Accuracy : 47% -> 12%

CHAPTER

06 Technology_Generative adversarial Networks

Our System Tasks : **Human easy, Computer hard**

사람인가요?
오른쪽 이미지를 보고
일치하는 이미지를 모두 고르시오

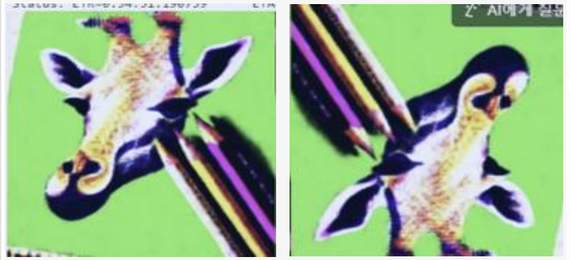


Our System

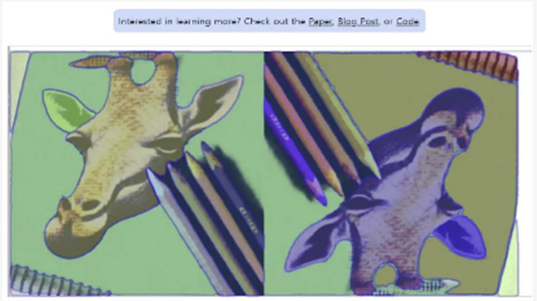
CHAPTER **06** Technology_illusion Diffusion

AI Evaluate

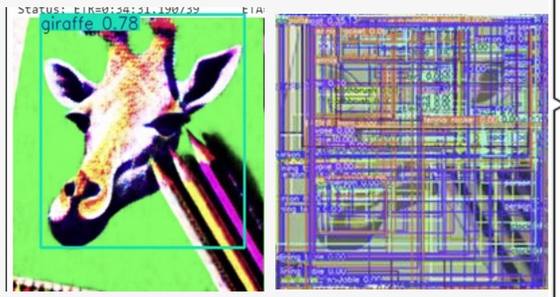
Flip Illusion



SAM



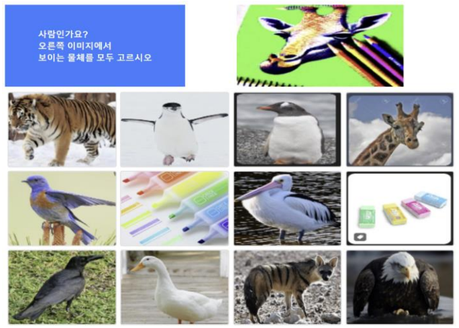
Yolov11

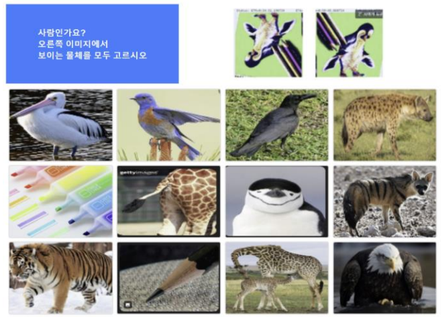


cat	0.13
Potted plant	0.008
Person	0.002
Sicssors	0.000

Tasks : Ask Abstraction Questions

- **Choose all objects that you can see**

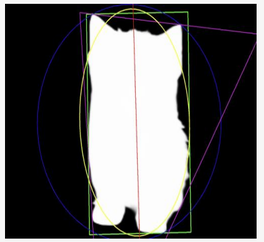




CHAPTER 06

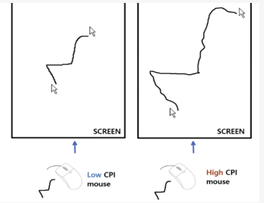
Technology_Multi-Dimension CAPTCHA

OpenCV - Contour

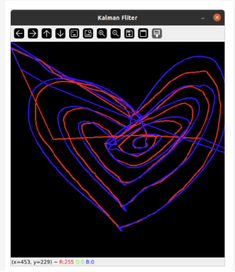


CNN Heatmap

Detect Mouse pointer



KalmanFilter



Action

Visual

DCGAN

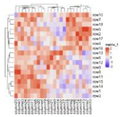
Flip Illusion

Background

PyTorch

The SAM model

ultralytics YOLO11



CHAPTER **08** Montly Plan

Month	Main	Specific
3	Image & Multidimensional CAPTCHA	- Develop various visible task only for user not AI - Expand Multidimensional CAPTCHA image and combine mouse detection - Functional testing & Performance testing
4	Developer Assist & Control Console	- Add Control Console to make system manage and setting easier -> Dashboard, Customizing option, User manage, Log and monitoring - Write precise document(How to use, Error code, Guide step)
5	Docker & API	- Compose Docker and select Cloud Service - User testing & Security testing - Expand and enhance performance
6	Deploy	- Integration testing - Pre-deployment testing - Automated testing

Thank You!

Project Repository

Youtube

Notion Page

GitHub Page