

# iKarate: Improving Karate Kata

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In Collaboration With:



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Dr. Ayman Nabil

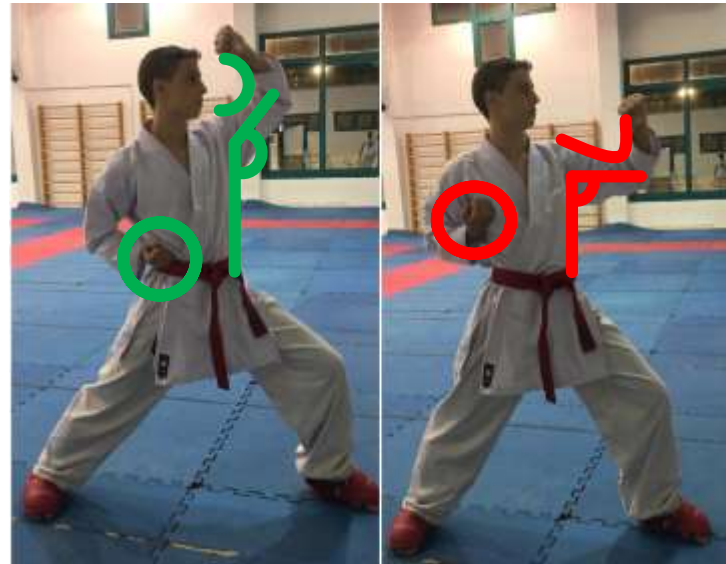
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15/1/2020

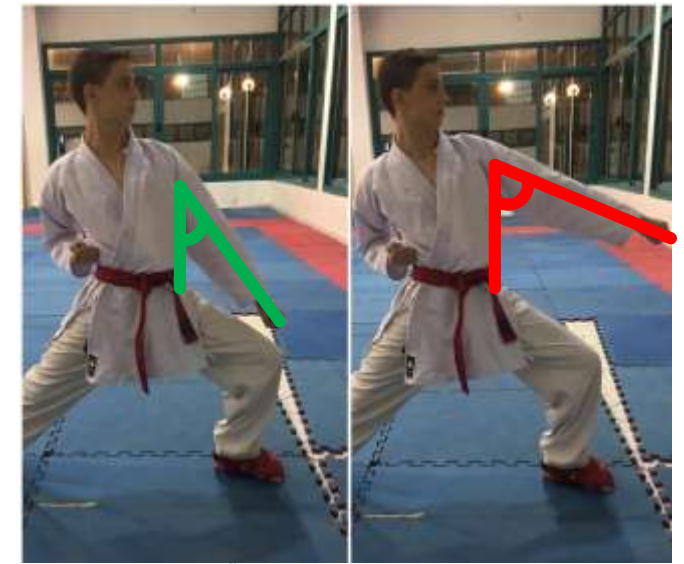
# INTRODUCTION

- ❑ Karate Kata is composed of moves.
- ❑ Moves must be done in a certain way.
- ❑ **Common mistakes:**
  - Joints Angle.
  - West Rotation.
  - Hand Position.
  - Leg Position.

Age Uke



Gedan Barai

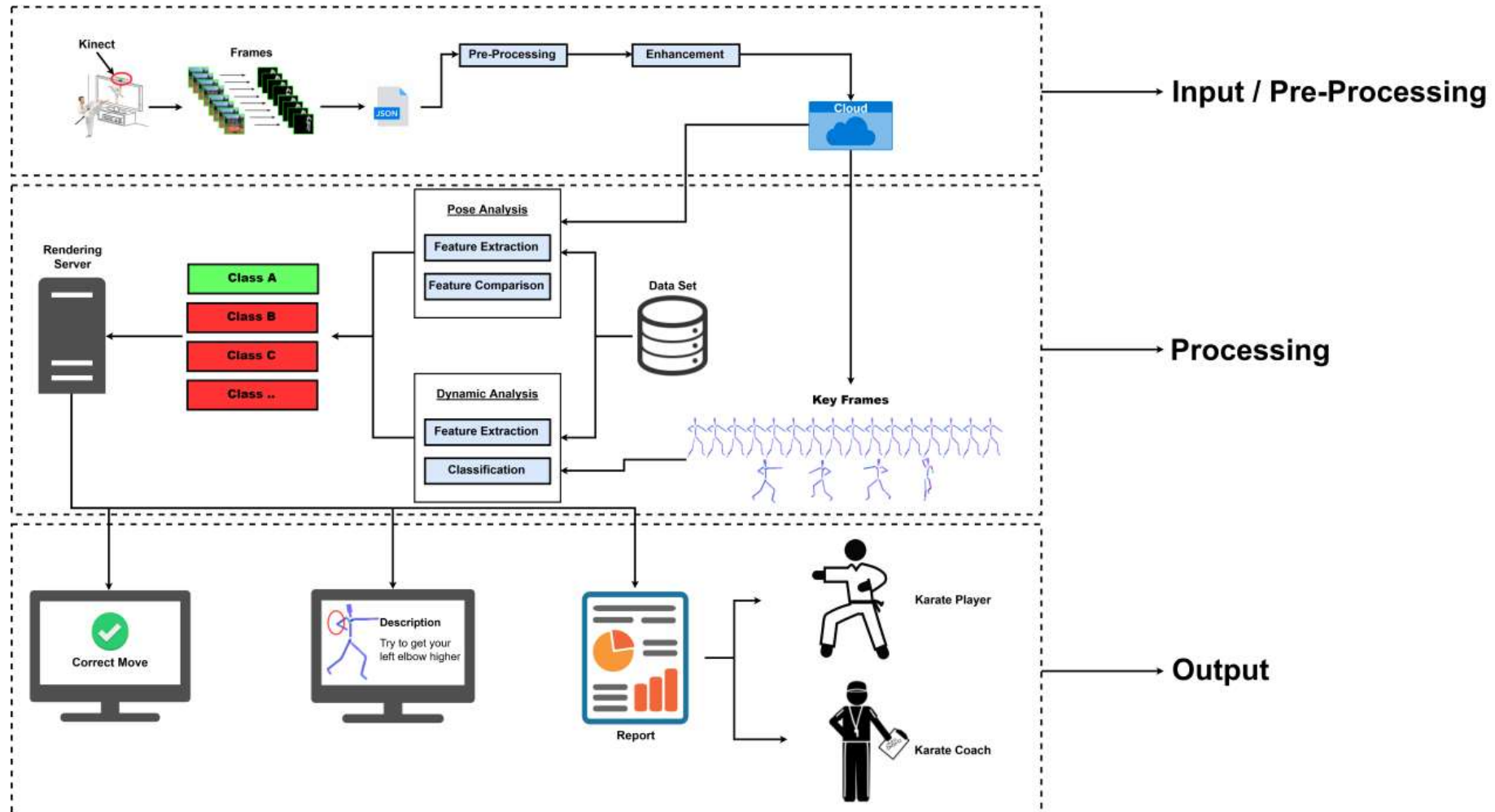


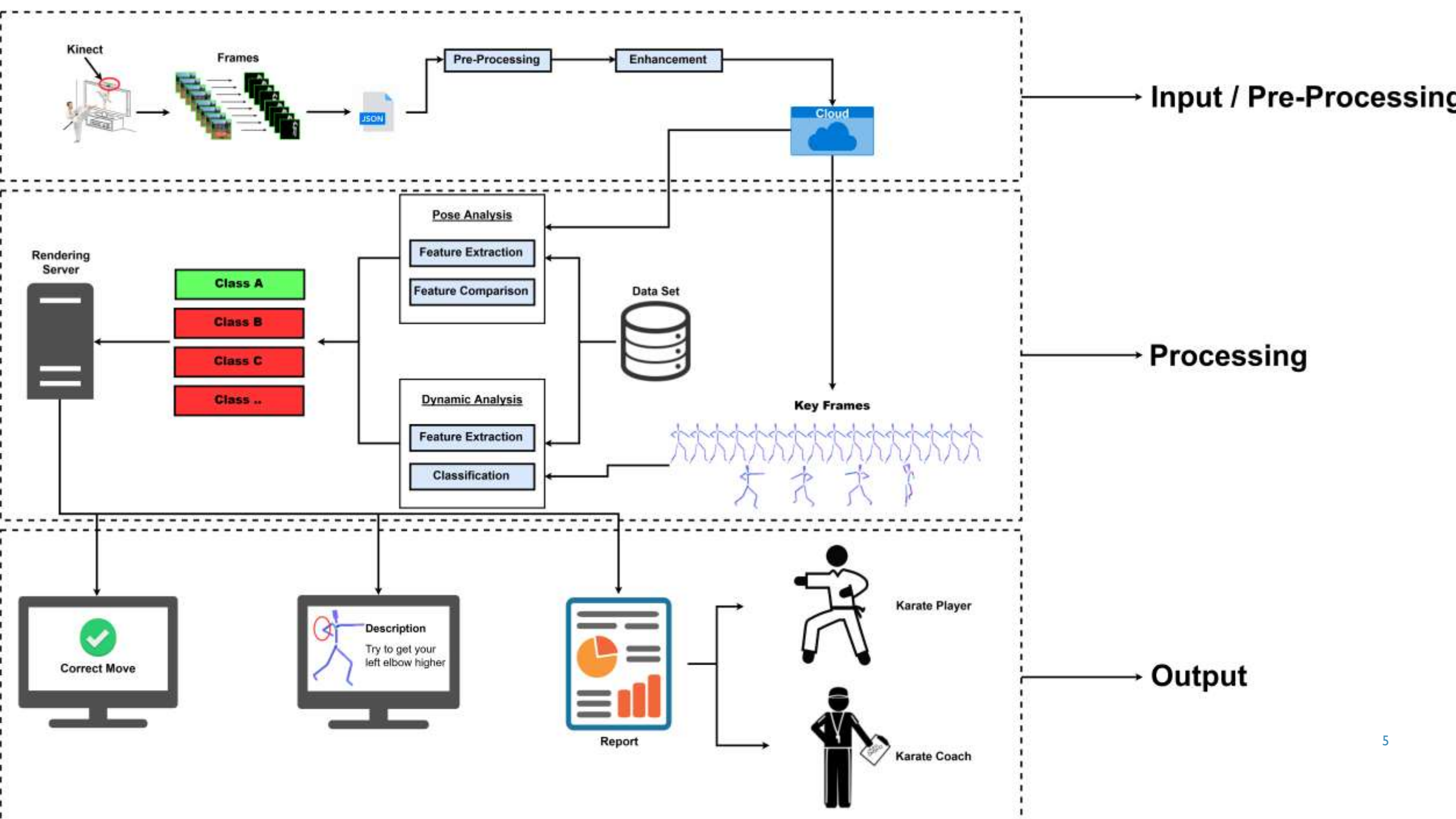
## PROBLEM STATEMENTS



Enhancing the **Classification Accuracy** of karate kata, providing **Real-Time Feedback** and taking into consideration the Different Speed And Body Proportions.

# SYSTEM OVERVIEW





# MAIN FUNCTIONAL REQUIREMENT



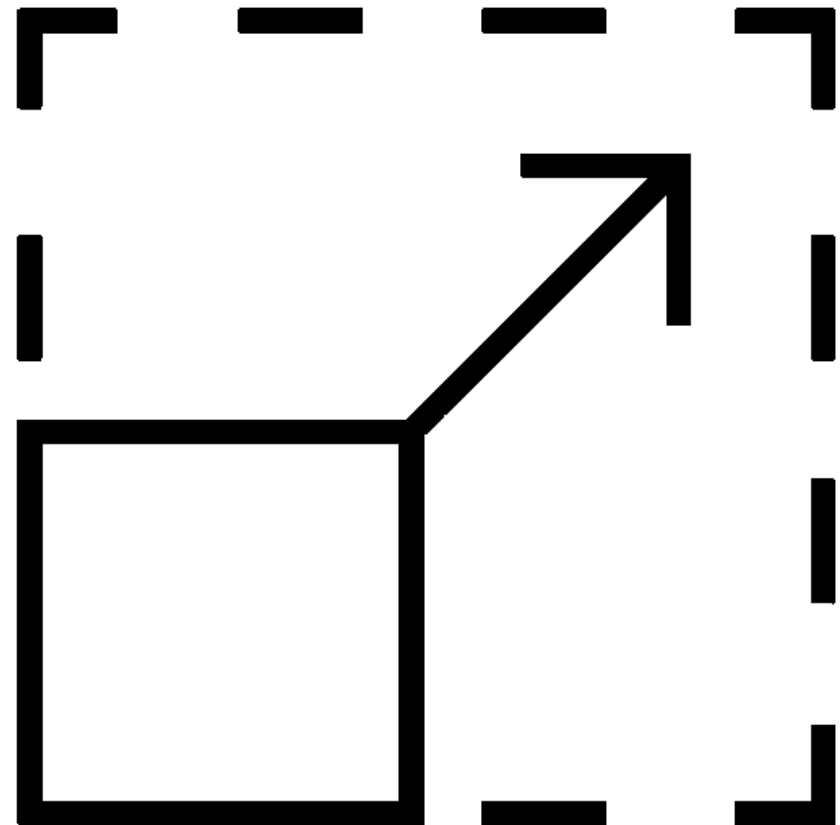
Name	Classify Movement
Code	F6
Priority	Extreme
Critical	10/10
Description	This function uses F-DTW to compare the data to the model. After the player movement has been extracted and pre-processed, the server compares the player's movement to existing movement's template, and determine which movement was performed, the mistake type and the movement accuracy.
Input	Template Model, JSON file of player movement.
Output	Array of Movement objects (Name, Mistake type and Accuracy)
Pre-condition	Classification model must be ready on the server, Internet condition must exist.
Post-condition	Report functions(F18)/system receives the output.
Dependency	User must be logged in, F1, F8, F9
Risk	Classifier might misinterpret a move for another or give false accuracy.

# MAIN NON-FUNCTIONAL REQUIREMENTS

## SCALABILITY



- Firebase is used to handle huge number of records.
- Decorator design pattern is used for customized reports.
- System's core functionalities will operate on the cloud.

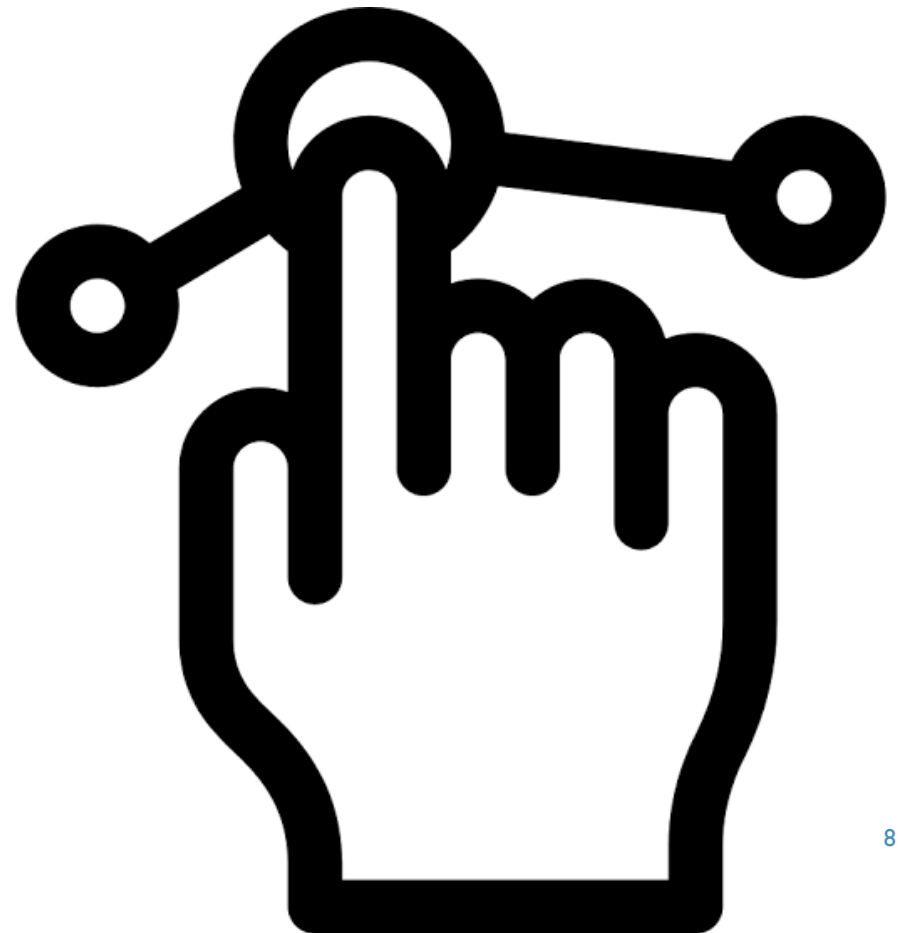


# MAIN NON-FUNCTIONAL REQUIREMENTS USABILITY



## Main Nielsen's Heuristics for User Interface Design:

- Visibility of system status.
- Aesthetic and minimalist design.
- Help users recognize, diagnose, and recover from errors.
- Help and documentation.





# MAIN NON-FUNCTIONAL REQUIREMENTS

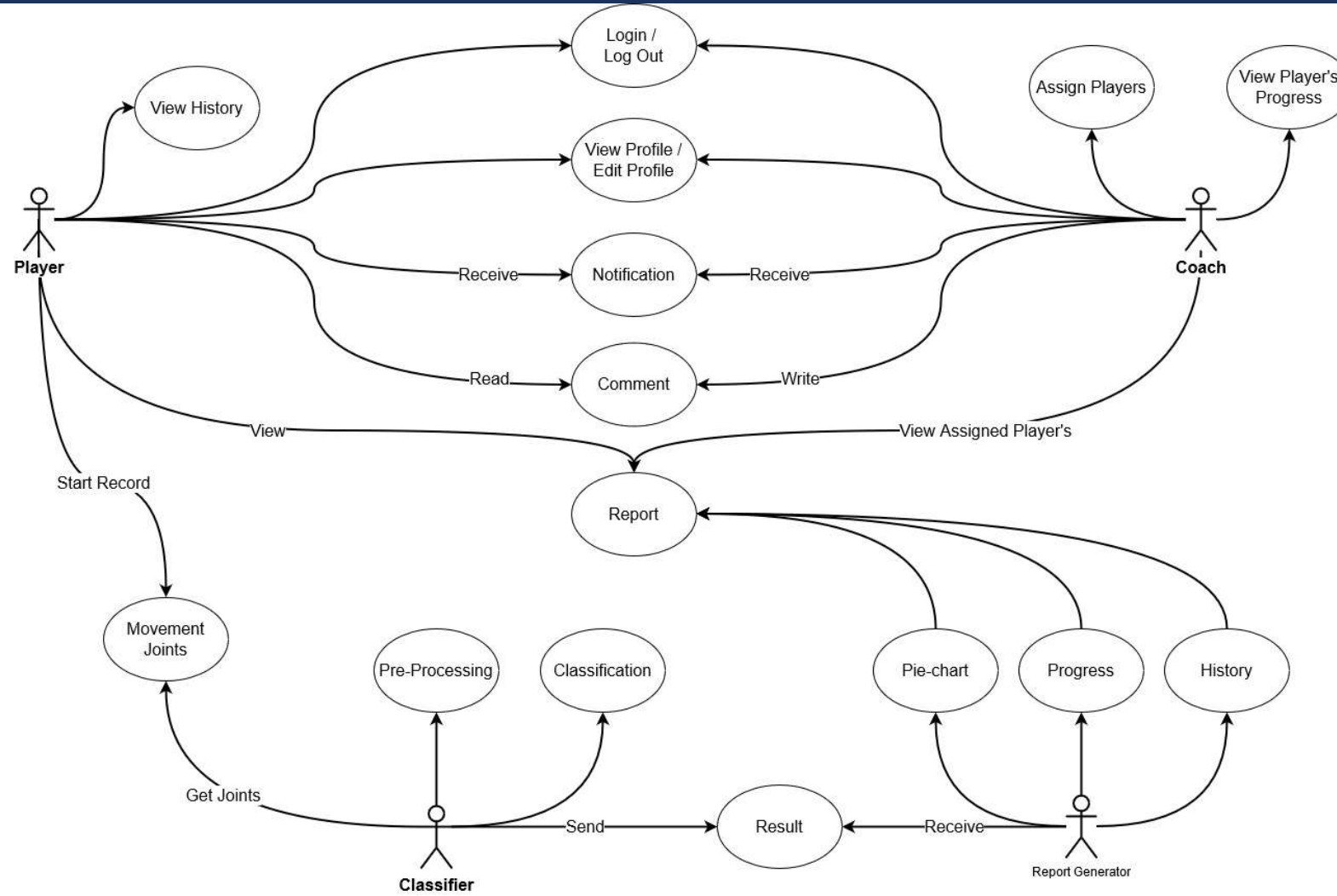
## MAINTAINABILITY

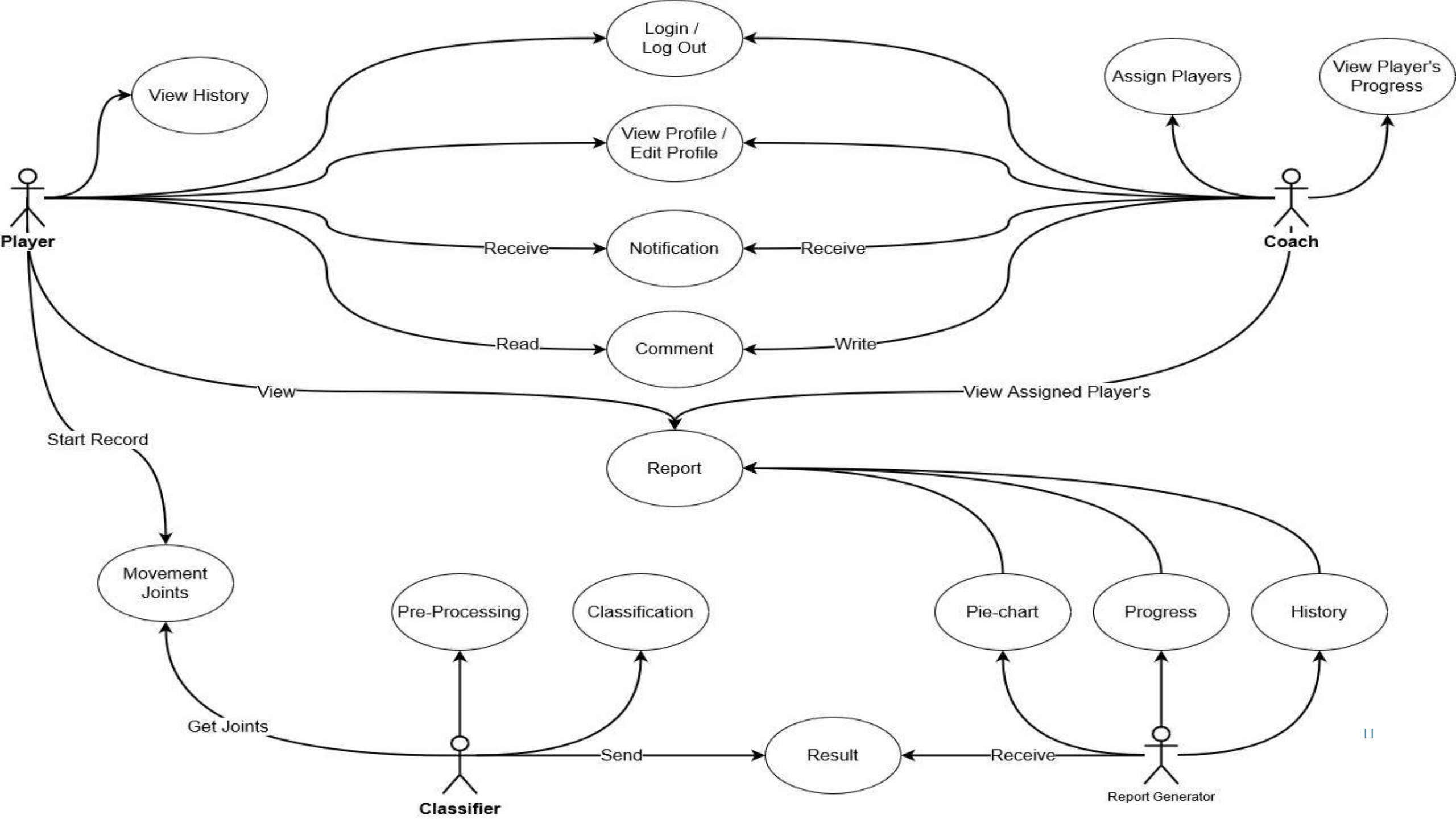


- Old data is going to be moved to another database.
- MVC (Model – View – Controller) design pattern is used for changing the user’s model and view.
- System could be upgraded to add new moves.
- Design patterns are used to provide a way to solve software issues.

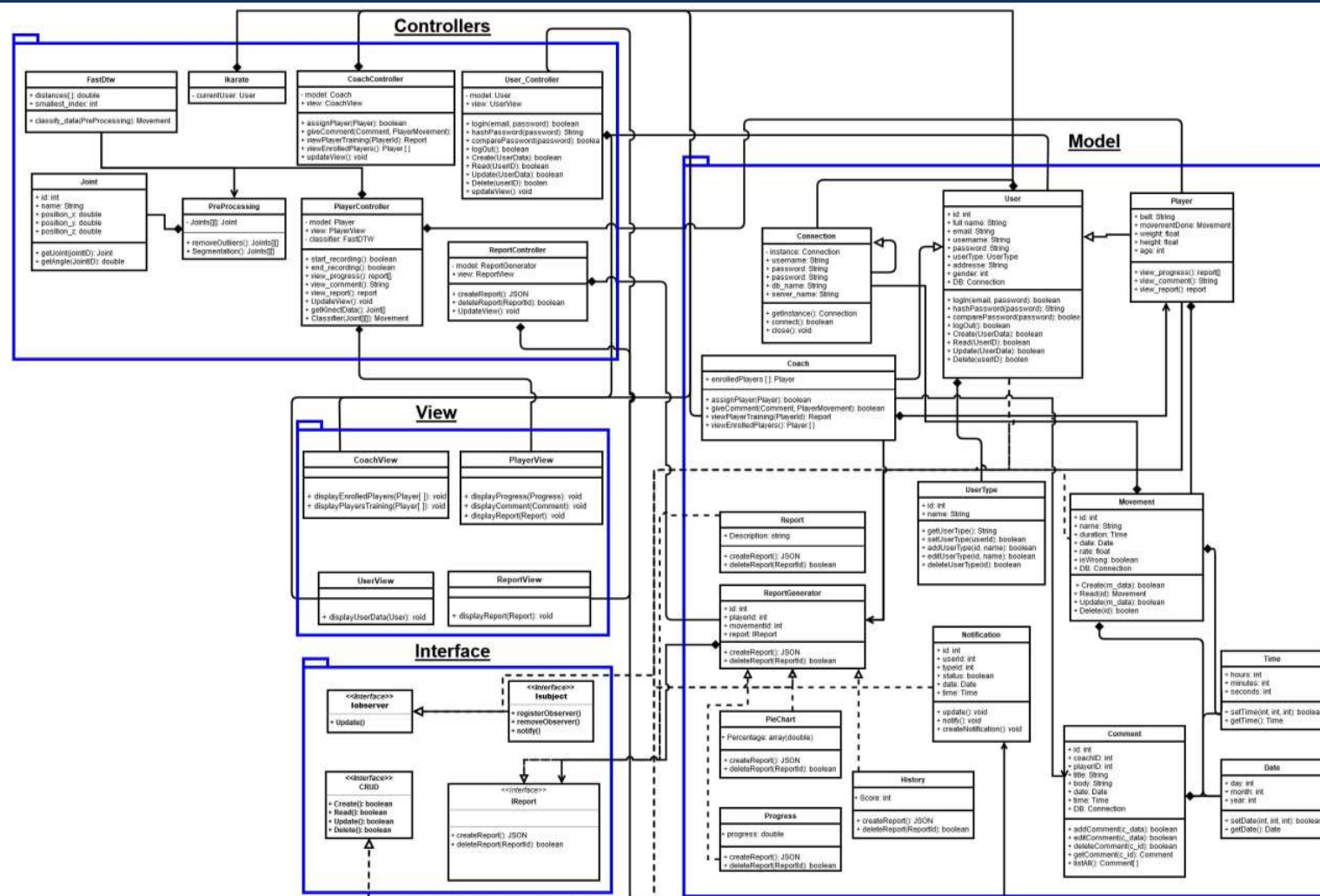


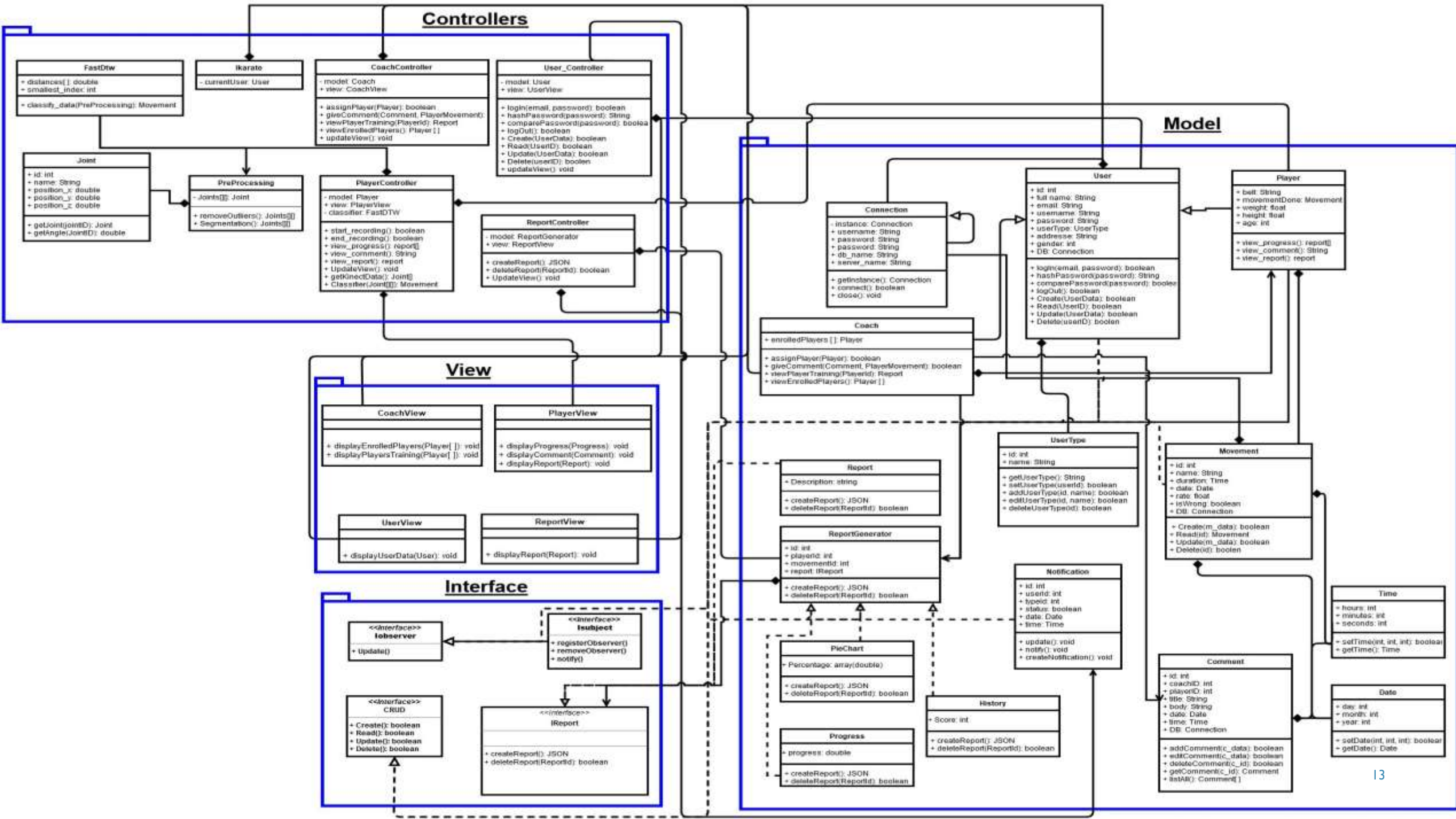
# USE CASE





# CLASS DIAGRAM

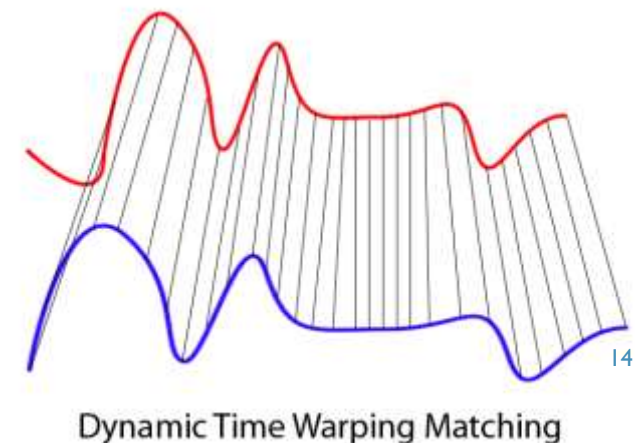
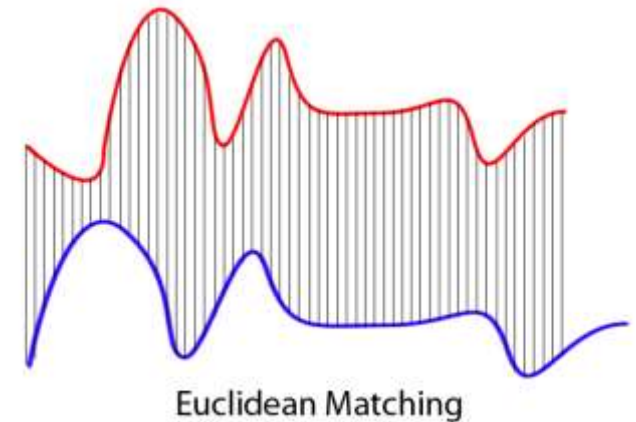




# PROCESSING

## □ Main used algorithm (F-DTW):

- Is an algorithm for measuring similarities between two signals.
- Each signal may have different speed from the other signal.
- Each signal doesn't need to be matched with its mirror.



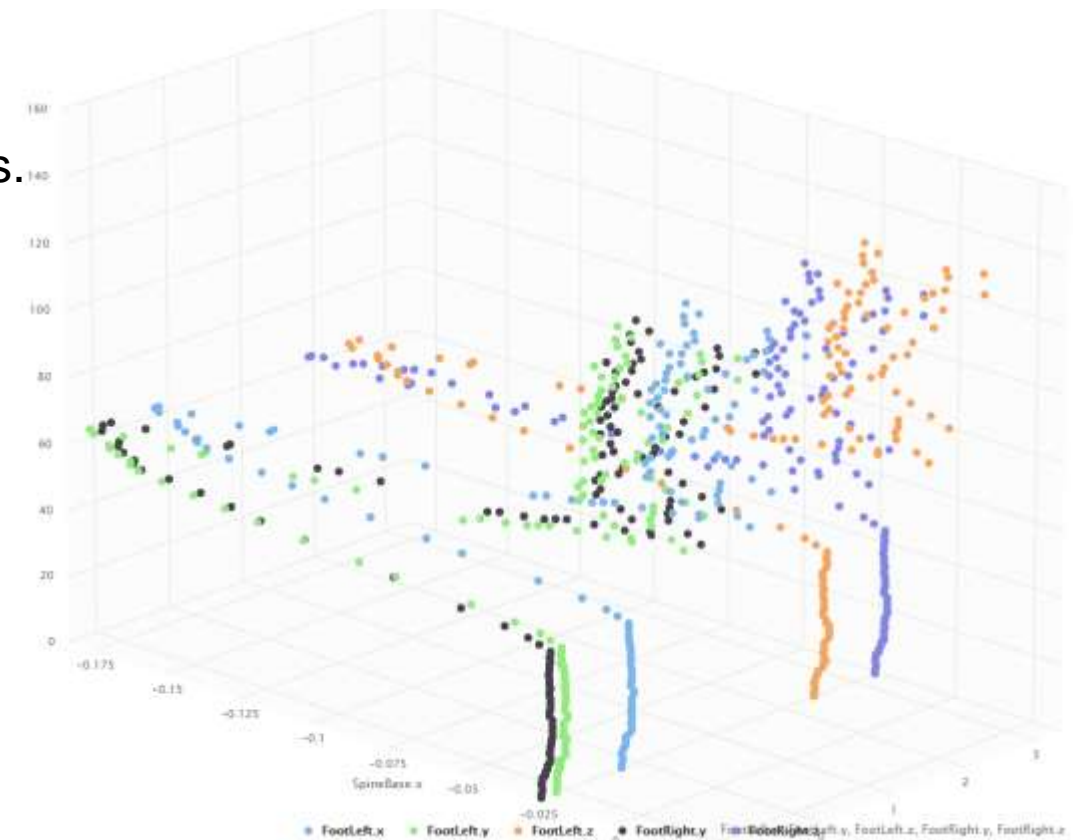
# EXPERIMENTS

- ❑ The system has been tested with a Karate player from Al Ahly Sporting Club.
- ❑ **The system has been tested on the following moves:**
  - 1) Age-Uke.
  - 2) Mae-Geri.
  - 3) Gedan-Barai.
  - 4) Soto-Uke.
- ❑ The player made each move and its common mistakes 10 times.



# RESULTS

- ❑ The average accuracy is 90%.
- ❑ We noticed that accuracy decrease with leg moves.





# PAPER SUBMISSION & ACCEPTANCE



ELSEVIER



## Ambient Systems, Networks and Technologies Conference

ANT-2020 notification for paper 95 Inbox x

**ANT-2020** <ant2020@easychair.org>  
to Bassel

Dear Bassel Emad,

We are glad to inform you that your paper:

Paper ID: 95  
Paper Title: iKarate: Improving Karate Kata  
Authors: Bassel Emad

has been accepted as a Full Paper at the 11th International Conference on Ambient Systems, Networks and Technologies (ANT-2020)

You should refer to the comments of the reviewers attached to this email to assist you in preparing the camera-ready for publication.

Please refer to (<http://cs-conferences.acadiau.ca/ant-20/#cameraReadySubmissions>) for preparing and submitting the Camera-ready copy of your paper (maximum 8 pages) for inclusion in the proceeding

If you need assistance in the preparation of camera-ready copy, send an email to: [cr-submit@gmail.com](mailto:cr-submit@gmail.com)

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General information on conference venue, accommodation, conference program, registration, visa, etc. can be found at the conference web site at: <http://cs-conferences.acadiau.ca/ant-20/>

Please note that April 7, 2020 is the first day of the technical sessions; however, April 6, 2020 evening the registration at the front desk starts on.

Thank you and congratulations on the acceptance of your paper. We look forward to seeing you on April 5, 2020 in Warsaw, Poland.

Sincerely,  
ANT 2020 Organizing Committee

SUBMISSION: 95  
TITLE: iKarate: Improving Karate Kata

12:27 PM (2 hours ago)



# CONFERENCE REVIEW



----- REVIEW 3 -----

SUBMISSION: 95

TITLE: iKarate: Improving Karate Kata

AUTHORS: Bassel Emad, Omar Atef, Yehya Shams, Ahmed El-Kerdany, Nada Shorim, Ayman Nabil and Ayman Atia

----- Overall evaluation -----

SCORE: 2 (accept)

---- TEXT:

The paper presents a working solution to capture Karate moves using the Kinect sensor and analyze these moves using machine learning. The authors make a good point in explaining and motivating the problem addressed. The introduction is nicely written.

The paper is well written and structured and methodologically sound. The related work section is good and the research contribution clearly motivated.

The actual work and contribution are clearly described, the solution is evaluated in a real-world setting.

DEMO



# MARKET COLLABORATION

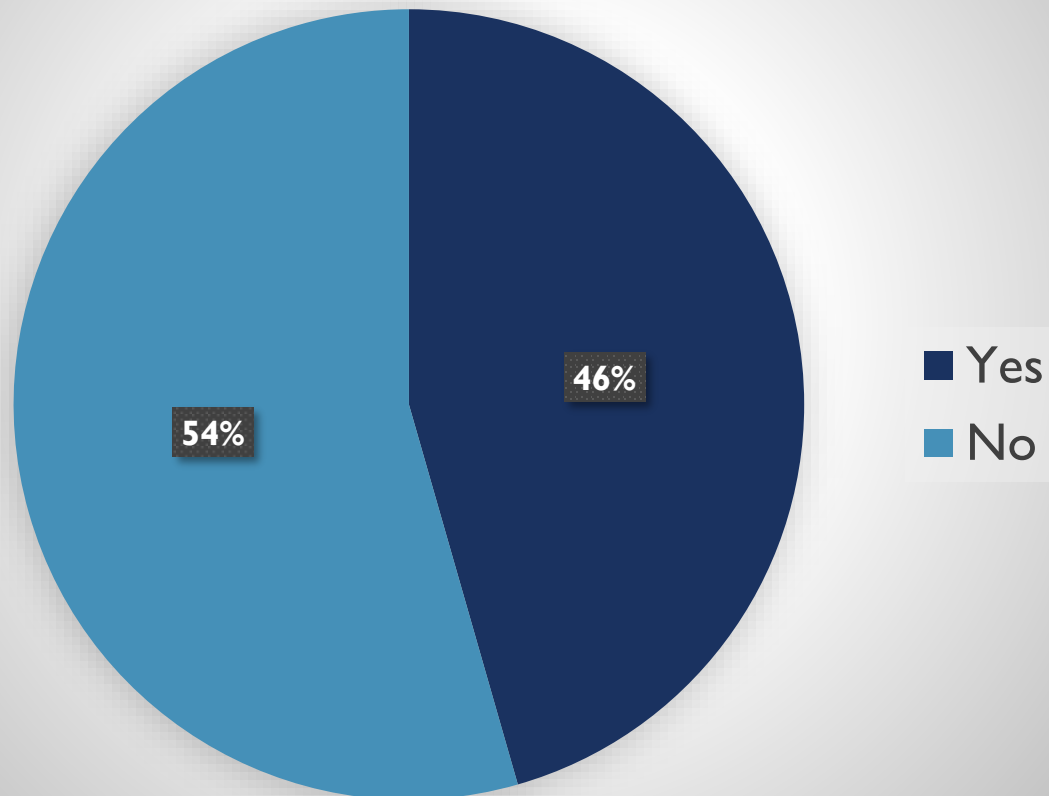


- This project is in collaboration with Al Ahly Sporting club.
- They are helping us in collecting the data-set and testing our system.
- The club is giving us reviews on the system.
- They intend to buy the system as soon as it's finished.

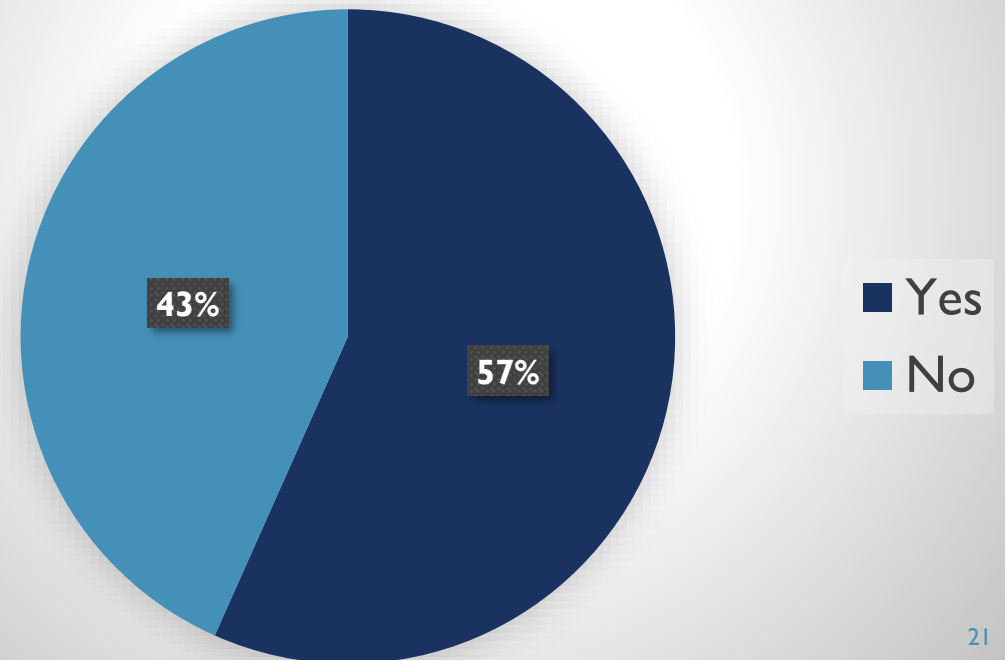


# SURVEY I/2

Have you ever played the Karate sport before?

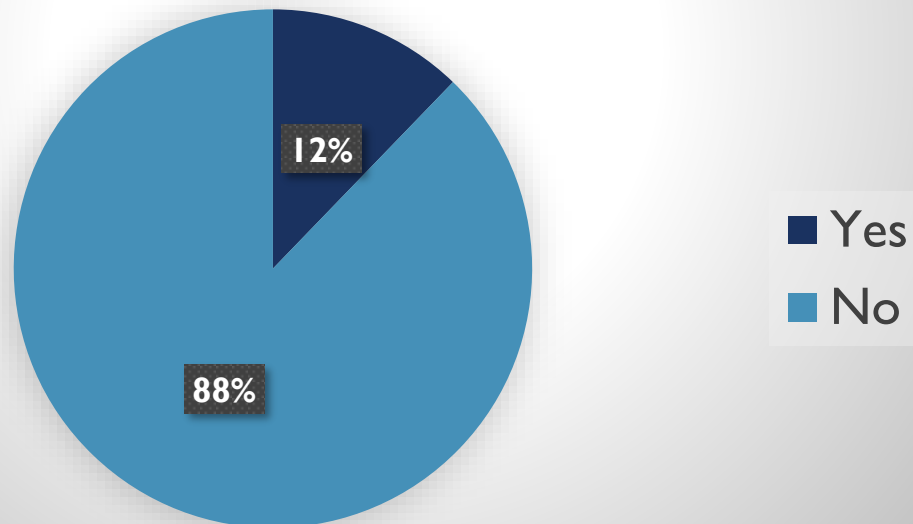


Do you think that Karate player take the attention they need from their coach during the training?

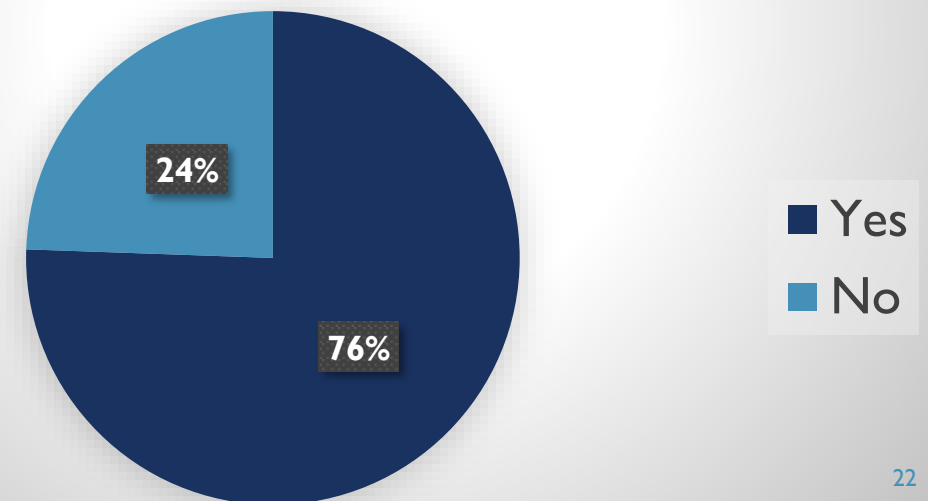


## SURVEY 2/2

**During the training or during the tournaments, do you think that the coach or the judge can detect all the mistakes done by the players without any wrong calls?**



**Would it be better if the coach and the judge were replaced by our system "iKarate", which is automated karate coaching and training using motion recognition and machine learning to produce a detailed report to the user?**



## SURVEY COMMENTS



karate needs to be developed in Egypt . such system will help but still coach cannot be replaced in my opinion

I think iKarate should assist the coaches and the judges not replace them.

They should work side by side and be dependant on each other

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# Live Demo



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Any  
questions ?

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**THANK  
YOU!**