5703 Group Based Capstone Project

Week 3 Tutorial Presentation

Project Number: CS03-1

Project Title: Use of machine learning to predict the foot progression angle during gait in people with knee osteoarthritis

Presenters: Feixiang Wang, Mohan Xi, Ruhao Ji, Weijia Chi, Tonghuan Liu, Yang Guo

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Summary of the most recent client meeting

[Presenter with fwan0760]

- Date of Meeting: 2025/3/10
- Key Points Discussed:
  - Weekly Meeting Format, Time and Location
  - Project Introduction and Data Example
  - Group member Background Introduction
  - Related Knowledge We Need to Learn
- Client Feedback and Requests:
  - Feedback 1: A Lab in Susan Wakil Health Building that we can use in meeting
  - Feedback 2: Good machine Learning basis
  - Request 1: Learn the Model CGM2.4 and read the book "*The Comprehensive Textbook of Biomechanics*"
  - Request 2: Learn how to process video data

Recap of Last Week's Plan

[Presenter with fwan0760]

- Planned Tasks/Goals from Last Presentation:
  - Task/Goal 1: Ensure the weekly meeting format with client
  - Task/Goal 2: Get the data from client
  - Task/Goal 3: Project details and what we need to learn to finish the project
  - Task/Goal 4: How to assign tasks in our group
  - Task/Goal 5: Create the slack working space and Github project

Group Progress

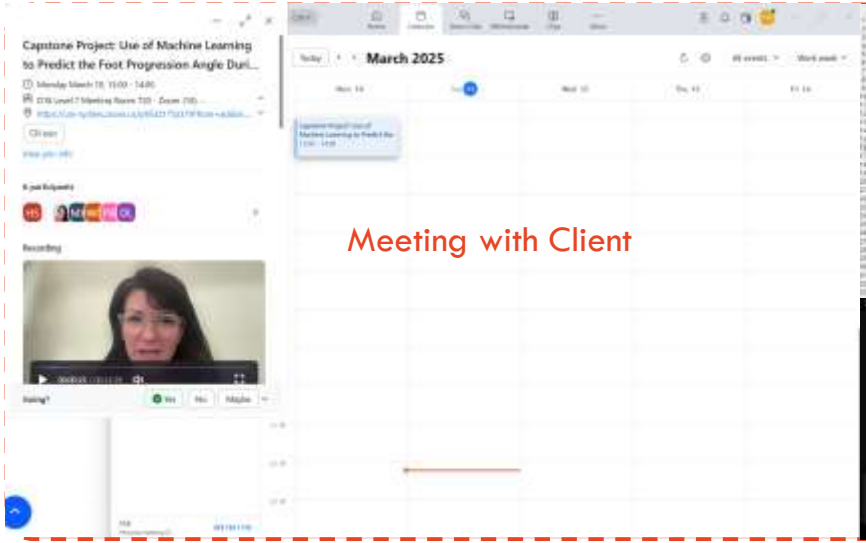
[Presenter with fwan0760]

- Achievements since Last Presentation
  - Progress 1: Hold the first meeting with client and ensure the weekly meeting format in future
  - Progress 2: Get the data example and introduction. However, client told us we cannot get whole data until next weekly meeting (next Monday)
  - Progress 3: Get some materials from client.
  - Progress 4: Ensure the group organization.
- Alignment with Client/Project Requirements
  - We need to determine the format of the weekly meetings (which has already been decided) and client hopes that we learn some relevant knowledge (which is already in our plan throughout the semester, with the client providing relevant guidance materials).

Group Progress Evidence

[Presenter with fwan0760]

Screenshot / Demo



Meeting with Client

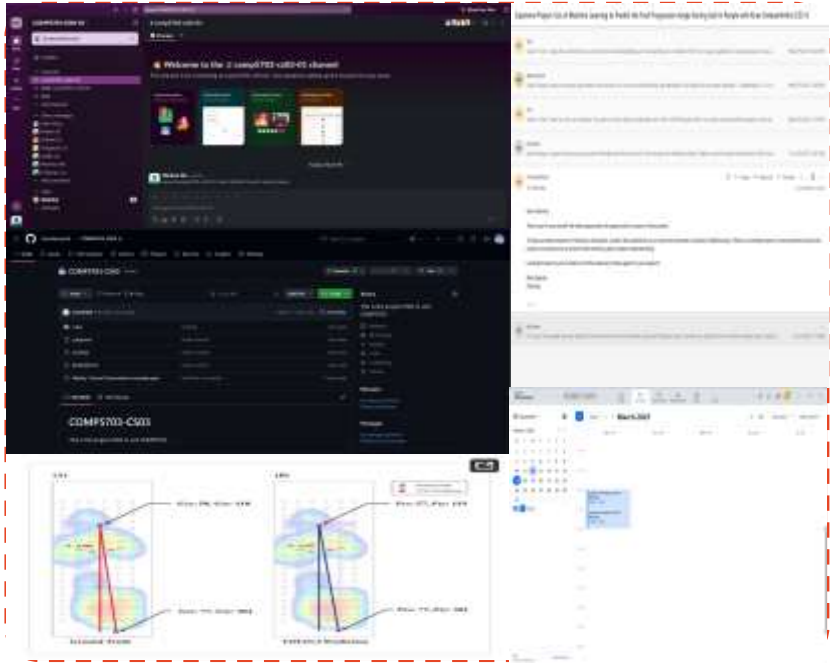
Data example

Individual Progress – Member 1

[Presenter with fwan0760]

- Create the Slack working space and send the invitations to my group members and tutor.
- Create the github project and send the invitations to my group members and tutor.
- Communicate with client and ensure the first meeting time, location and format
- Learn the knowledge about *Biomechanics*
- Organize the Weekly Meeting in Future
- Read some papers related to this project

Screenshot / Demo

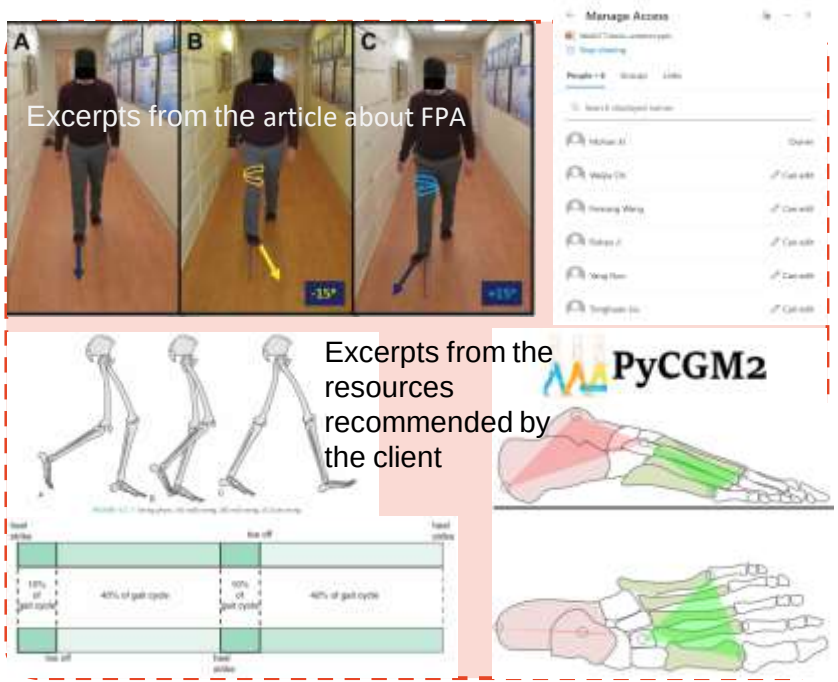


Individual Progress – Member 2

[Presenter with moxi0368]

- Understand the background of the project.
- Read some articles about FPA.
- Understand the significance of the project.
- Read the two resources recommended by the client.
- Create a Microsoft shared document and invite each group member to co-edit the PowerPoint.

Screenshot / Demo

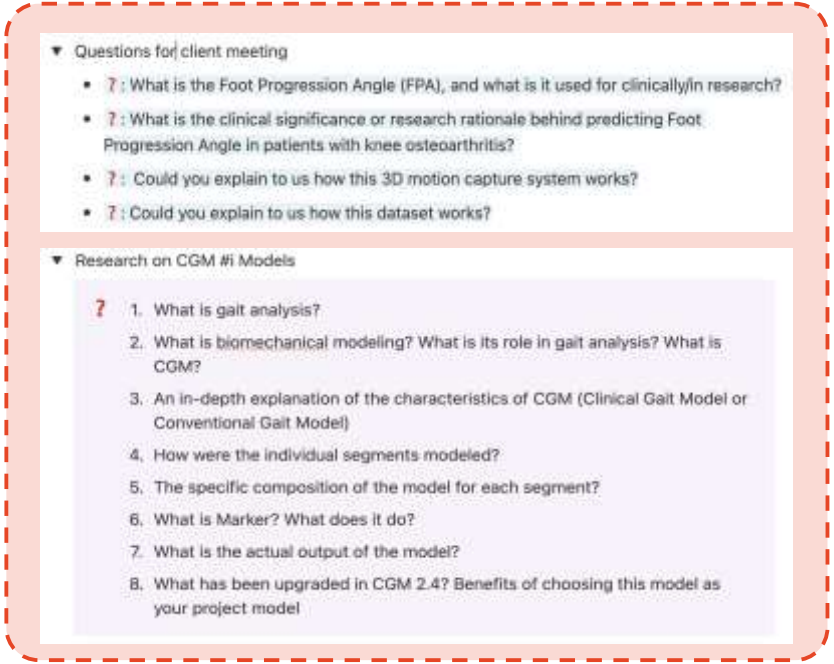


Individual Progress – Member 3

[Presenter with ruji6336]

- Before the client meeting
  - Go through the project requirement and have a research on gait analysis
  - Prepare some questions for the client meeting
- After the client meeting
  - Have a deep research on CGM #i Models which client recommend to study

Screenshot / Demo

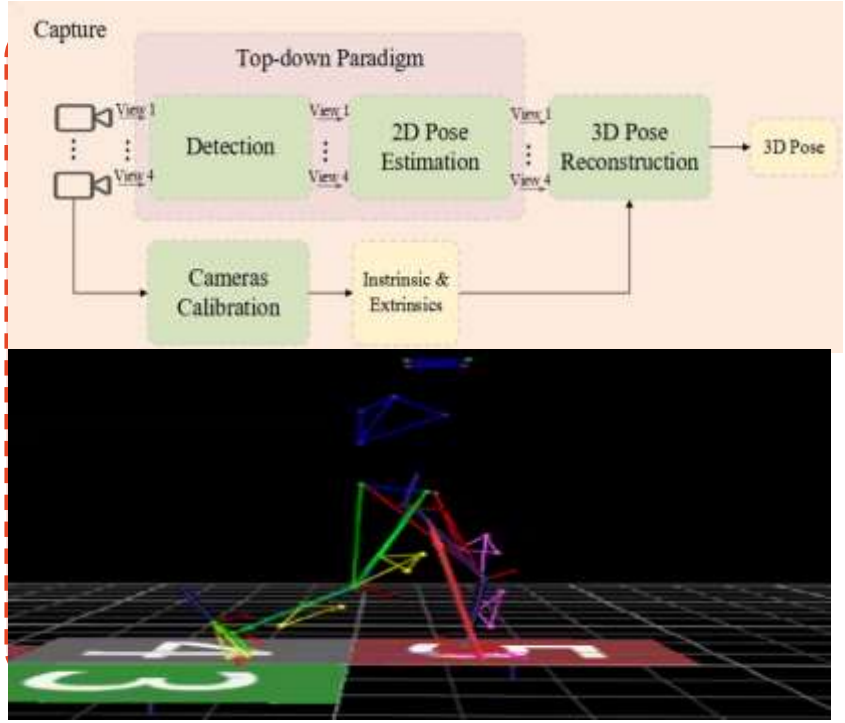


Individual Progress – Member 4

[Presenter with wchi0957]

- Understand the project objectives
- Learned about the features of the client-provided software, Vicon Nexus
- Read the papers provided by the client
- Read the articles on the integration of 2D and 3D data
- Attended client meetings and team meetings

Screenshot / Demo

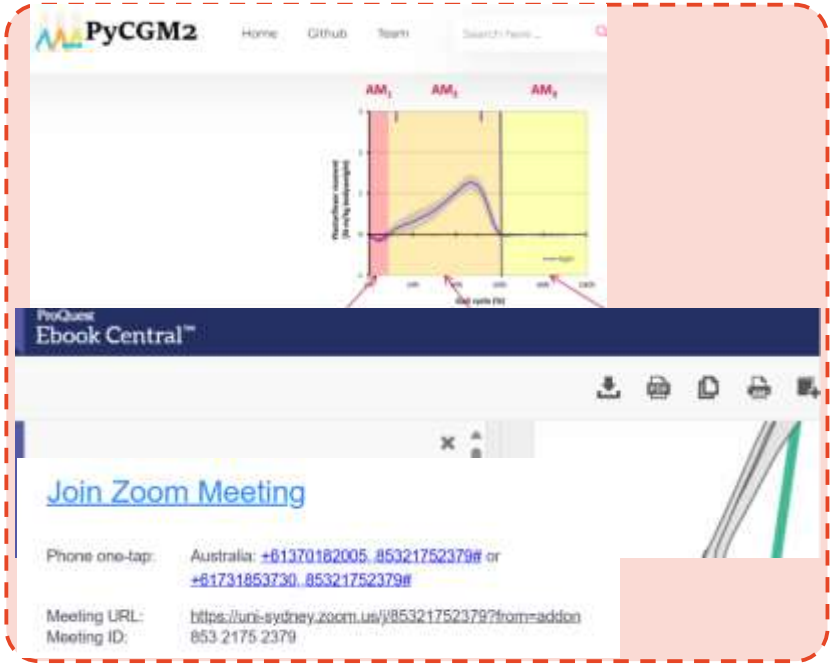


Individual Progress – Member 5

[Presenter with tliu0082]

- Engagement with the Client
- Biomechanical Analysis and Data Understanding
- Papers related to the project
- Understanding of the background of the project

Screenshot / Demo



Individual Progress – Member 6

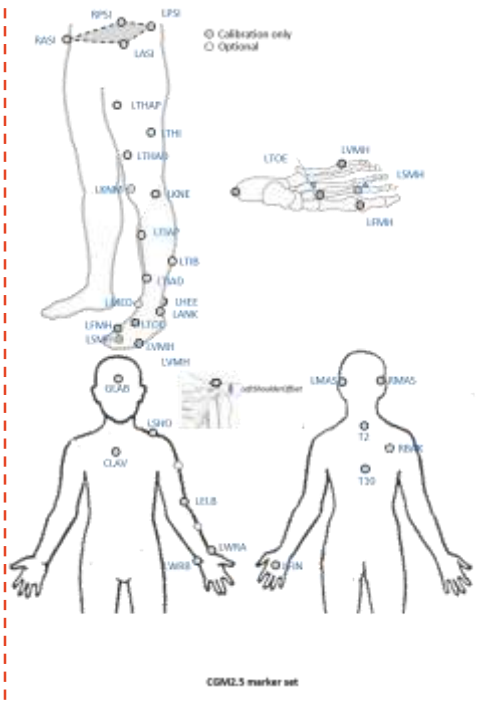
Screenshot / Demo

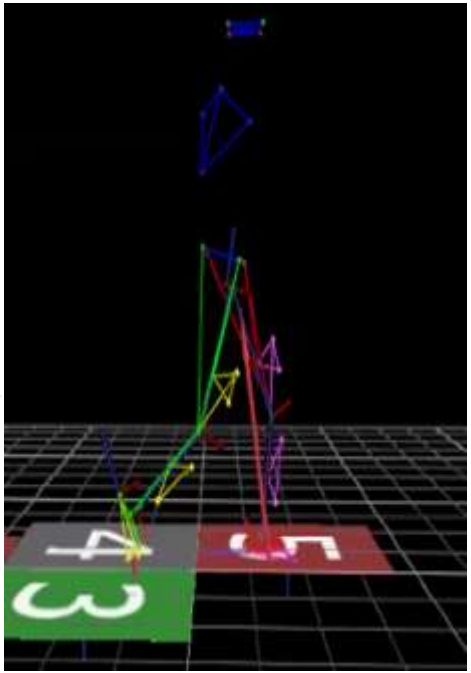
[Presenter with yguo0583]

- One hour meeting(Comprehending the dataset, Setting the next progress)
- Foot orientation in CGM & PiG:

  I. CGM: Captures only long-axis orientation.

  II. PiG: Estimates rotation using the heel marker (unvalidated).
- After Meeting: I. The frequency of meeting: once a week.
- II. Next Monday(2025/03/17) go to the lab.(We'll decide what the way to analytic the data)





Challenges & Issue

[Presenter with fwan0760]

- Group-Level Challenges
  - Lack of knowledge in *Biomechanics*
  - Lack of experience in processing video data
  - Complex Data Structure
- Individual-Level Challenges
  - Feixiang Wang: Review LSTM, GRU
  - Yang Guo: Review Attention and Transformer
  - Mohan Xi: Learn the knowledge about time series data
  - Weijia Chi: Introduce data features and structure to team members
  - Tonghuan Liu: Learn some knowledge about deep learning
  - Ruihao Ji: Focus on Video data and help team members to process them

What's the plan before next tutorial?

- Tasks/Goals for Upcoming Week
  - Task/Goal 1: Get the whole data and learn the data details
  - Task/Goal 2: Learn related knowledge in *Biomechanics*
  - Task/Goal 3: Read the paper related to this project
  - Task/Goal 4: Try to build the demo model and evaluate the difficulties
- Assignment of Responsibilities
  - Feixiang Wang: Read and introduce papers to other group members
  - Yang Guo: Build the Demo Model
  - Ruhao Ji: How to process video data in computer vision area
  - Tonghuan Liu: How to process video data in computer vision area
  - Weijia Chi: Introduce data features to other group members
  - Mohan Xi: Introduce Biomechanics Knowledge to other group members

[Optional] Any Questions?

- Question 1: Can we add more slides in tutorial presentation?

- Question 2: Because of client arrangement, we cannot access the data until next Monday. The major works will start from next week which we will show in the next week presentation. Will this affect the score?
- Question 3: When we record our zoom meeting, what information must be included?
- Question 4: Tutor did not agree the invitation in the github. Can you agree with the new invitation we sent to you?

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