

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

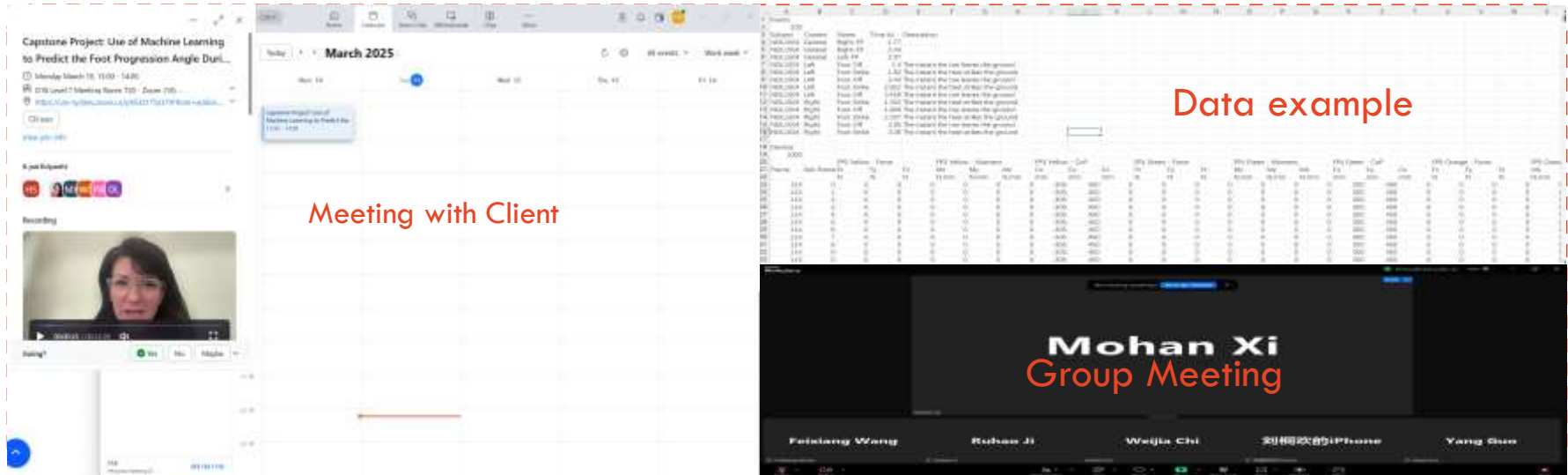
[Presenter with fwan0760]

- 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



The collage consists of three screenshots:

- Left:** A Zoom meeting interface. The title bar reads "Capstone Project: Use of Machine Learning to Predict the Foot Progression Angle Duri...". The meeting is titled "Monday, March 18, 11:00 - 11:30". A video feed of a woman is visible at the bottom.
- Middle:** A calendar view for March 2025. A date is highlighted, and a note is visible.
- Right:** A screenshot of a data spreadsheet. The text "Data example" is overlaid in red. The spreadsheet contains multiple columns of data, including names, dates, and numerical values.

Meeting with Client

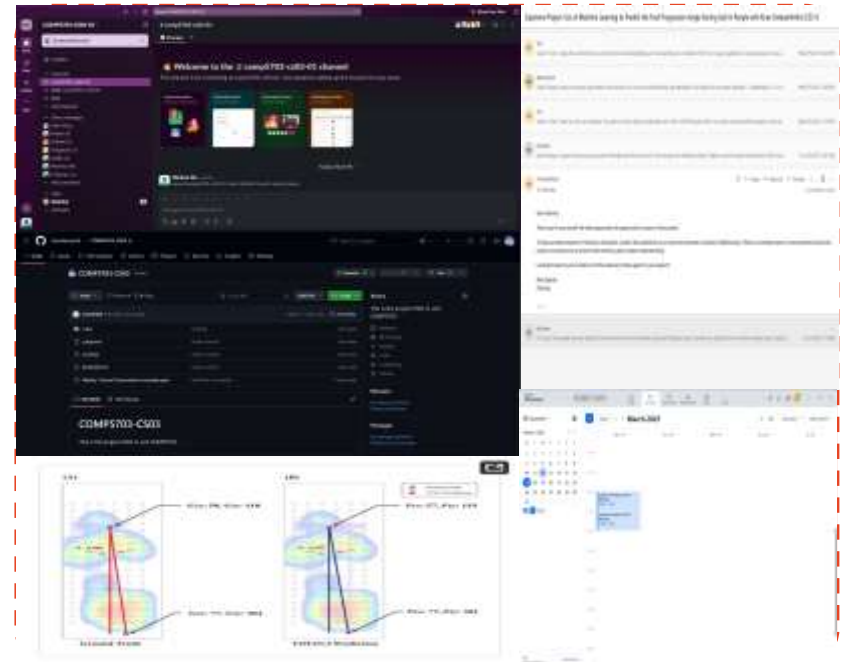
Mohan Xi
Group Meeting

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

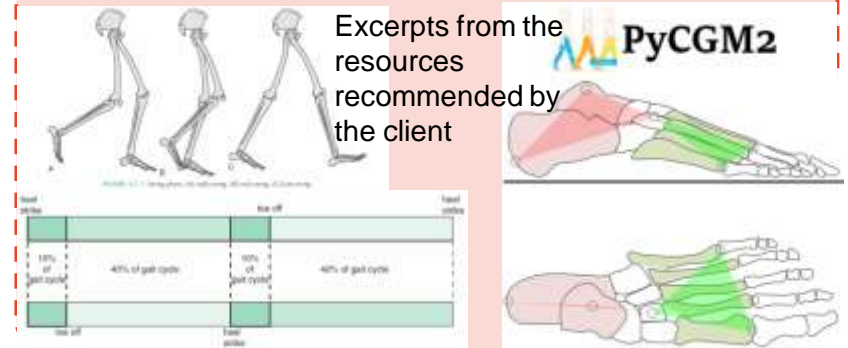
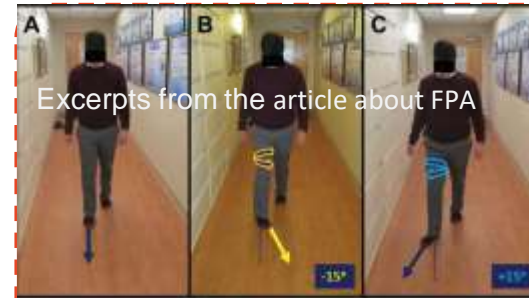


Individual Progress – Member 2

[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

▼ Questions for client meeting

- ? : What is the Foot Progression Angle (FPA), and what is it used for clinically/in research?
- ? : What is the clinical significance or research rationale behind predicting Foot Progression Angle in patients with knee osteoarthritis?
- ? : Could you explain to us how this 3D motion capture system works?
- ? : Could you explain to us how this dataset works?

▼ Research on CGM #i Models

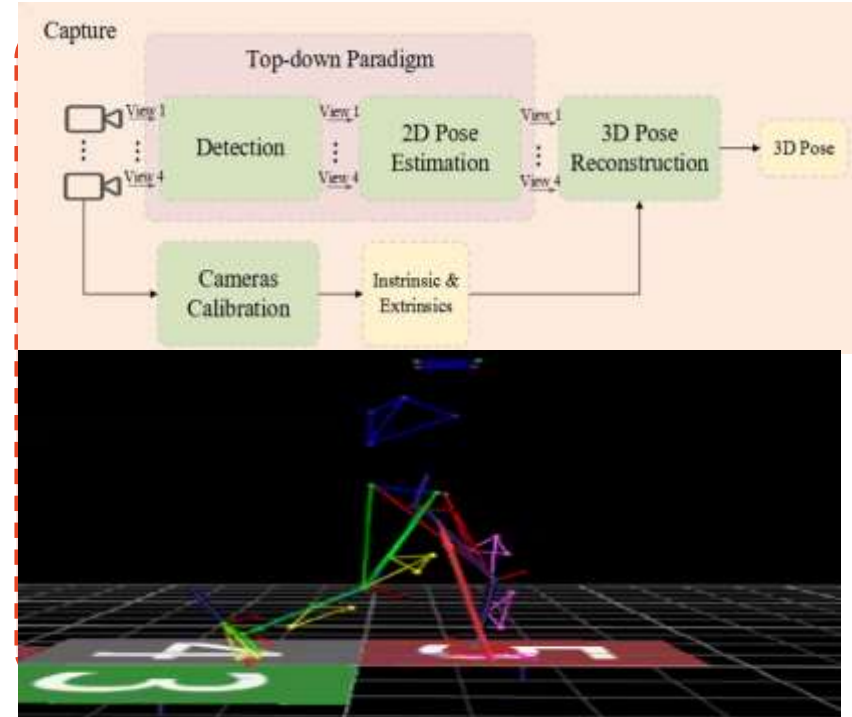
1. What is gait analysis?
2. What is biomechanical modeling? What is its role in gait analysis? What is CGM?
3. An in-depth explanation of the characteristics of CGM (Clinical Gait Model or Conventional Gait Model)
4. How were the individual segments modeled?
5. The specific composition of the model for each segment?
6. What is Marker? What does it do?
7. What is the actual output of the model?
8. What has been upgraded in CGM 2.4? Benefits of choosing this model as your project model

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

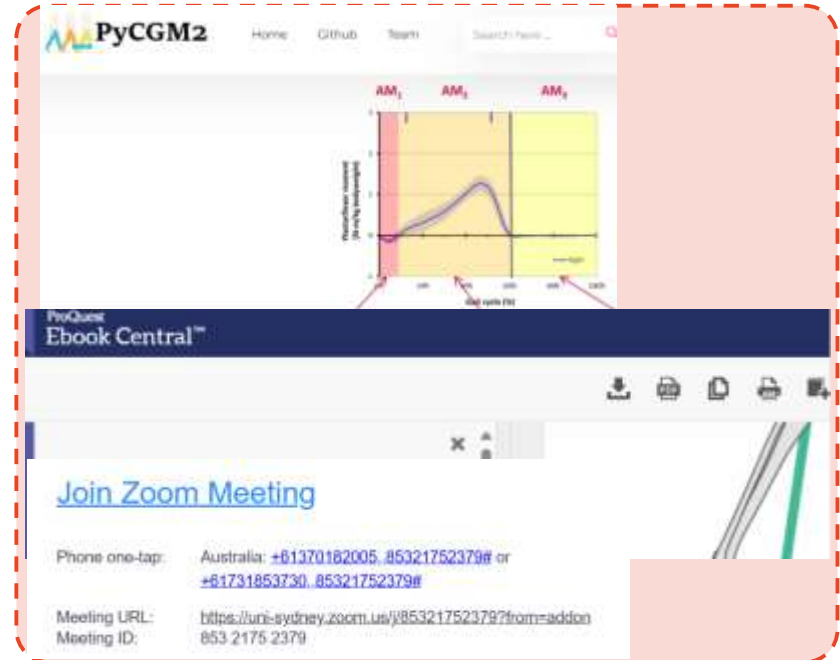


Individual Progress – Member 5

[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



The screenshot displays a web browser window. At the top, the 'PyCGM2' logo is visible, followed by navigation links for 'Home', 'Github', and 'Team', and a search bar. The main content area features a line graph with a yellow background. The y-axis is labeled 'Normalized vertical force (% body weight)' and the x-axis is labeled 'Time (s)'. The graph shows a curve that rises and then falls, with three vertical lines marking 'AM₁', 'AM₂', and 'AM₃'. Below the graph, there is a 'ProQuest Ebook Central™' banner. At the bottom of the browser window, a 'Join Zoom Meeting' section is visible, providing contact information and a meeting URL.

PyCGM2 Home Github Team Search for people...

Normalized vertical force (% body weight)

Time (s)

AM₁ AM₂ AM₃

ProQuest Ebook Central™

Join Zoom Meeting

Phone one-tap: Australia: +61370162005, 85321752379# or +61731853730, 85321752379#

Meeting URL: <https://uni-sydney.zoom.us/j/85321752379?from=addon>

Meeting ID: 853 2175 2379

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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