Forward Kinematics

2023 Computer Animation and Special Effects

Outline

- Overview
- Objective
- Report
- Scoring
- Submission

Overview

- Forward kinematics
- Time warping

Demo link: https://youtu.be/BveekvCkF3w

Overview (cont.)

- Blank template

Objective

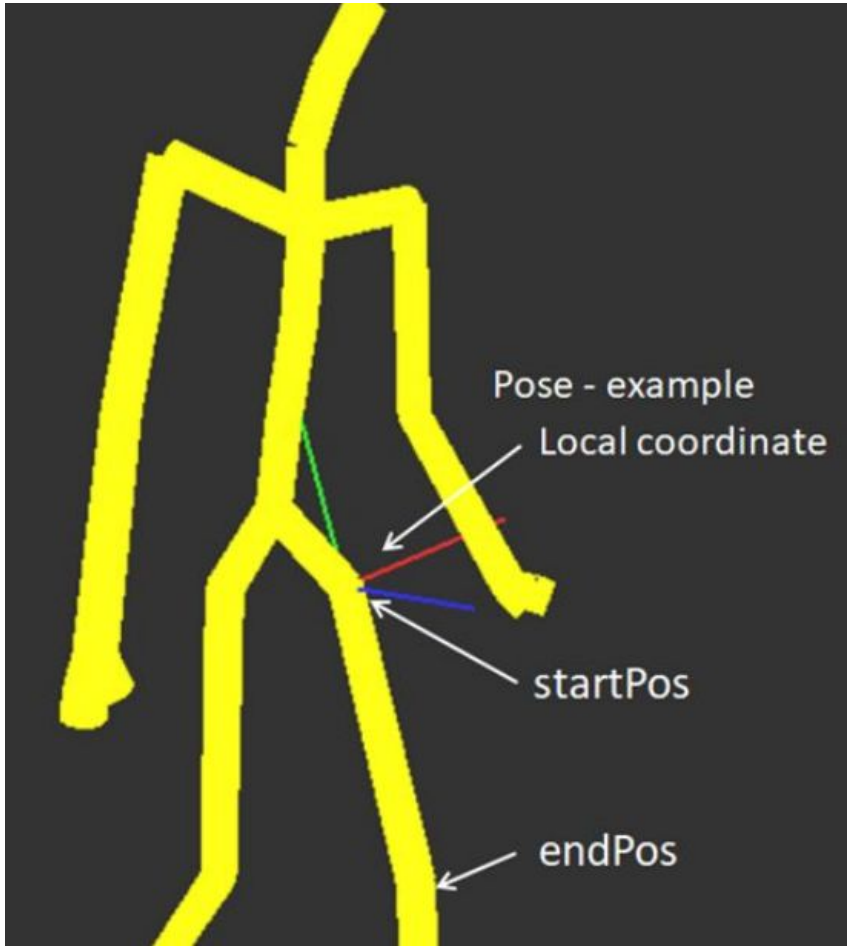
- Only two functions you need to implement in this homework
  - in kinematics.cpp
    - void forwardSolver(...)
    - std::vector<acclaim::Posture> timeWarper(...)
- Bonus
  - any creativity
  - don’t break original requirements
    - make an toggle for switching if it does
  - Mention it in your report

Objective (cont.)

- void forwardSolver(...)
  - Convert motion data from joint space to the Cartesian space
    - set each bone's global start and end position and rotation
  - Hint
    - review "kinematics.pptx" from p.1 - p.19 (may be updated later)
    - review "acclaim_FK_IKnote.pdf" from p.1 - p.4 (may be updated later)
    - read local coordinate data from posture first
    - you can probably use DFS or BFS to traverse all bones
    - you can check
      - struct Posture in posture.h
      - struct Bone in bone.h

Objective (cont.)

- Pose example
- Each bone has
  - local coordinate
  - start position
  - end position



Objective (cont.)

- std::vector<acclaim::Posture> timeWarper(...)
  - Goal
    - Implement time warping
    - Perform interpolation then update motion's translations and rotations
  - Hint
    - Perform linear interpolation on translation
    - Perform spherical linear interpolation on rotation
      - You can use slerp(), a member function in Eigen::Quaternionf

Report

- Suggested outline
  - Introduction/Motivation
  - Fundamentals
    - describe local and global coordinates in your words
  - Implementation
  - Result and Discussion
  - Bonus (Optional)
  - Conclusion

Scoring

- Forward kinematics (50%)
- Time warping (30%)
- Report (20%)
- Bonus (up to 15%)

Submission

- Please upload kinematics.cpp and report_< your student ID>.pdf respectively
- Late policies
  - Penalty of 10 points on each day after deadline
- Cheating policies
  - 0 points for any cheating on assignments
- Deadline
  - Sunday, 2023/04/16, 23:59