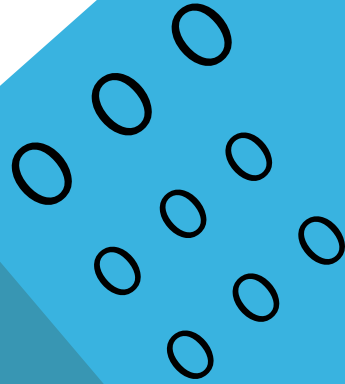


FITNESS AID APPLICATION WITH KINECT



CONTENTS

1. WHAT's going on?
2. WHY we need this?
3. Implement - Two Side of Application
 1. Recorder Side
 1. XML Data Structure
 2. Editing function
 2. Player Side
 1. Ratio & Position Correction
 2. Compare Algorithm



WHAT'S GOING ON?

Goal?

Personal Training (PT) at Home

For this

Recording By Trainer.

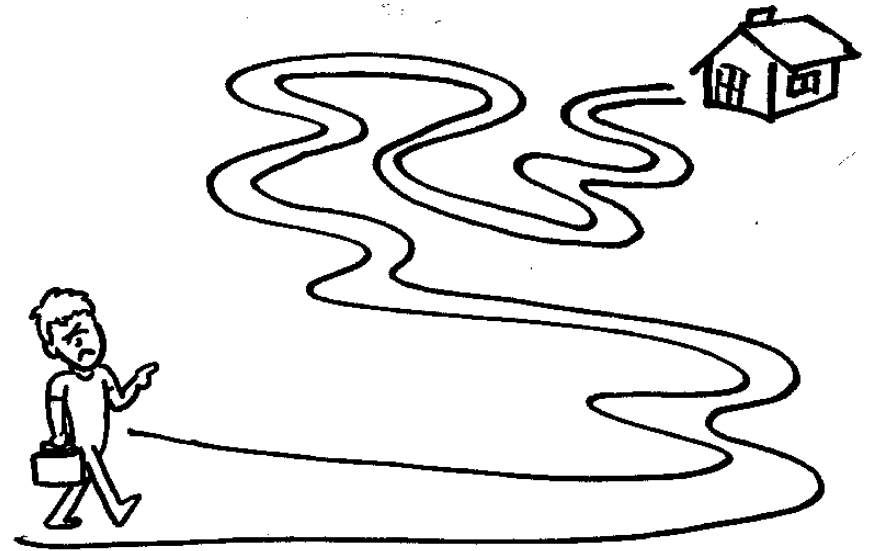
&

Used by Customer



WHY WE NEED THIS?

1. Visiting Gym is Time wasting.
2. Correct Form is important in fitness.



WHY WE NEED THIS?

Problem in current solution

Wii Fit

- Wii Fit does not care about what you're doing on the board
 - Impossible to check if posture is correct
 - Difficult to get feedback from a trainer



WHY WE NEED THIS?



TWO SIDE OF APPLICATION

Recording Gesture



Exercise with kinect



Recorder Side

Key Feature

1.XML Data Structure

- 1.Save Skeletal animation with xml

2.Editing function

- 1.Trim skeletal animation



XML Data Structure

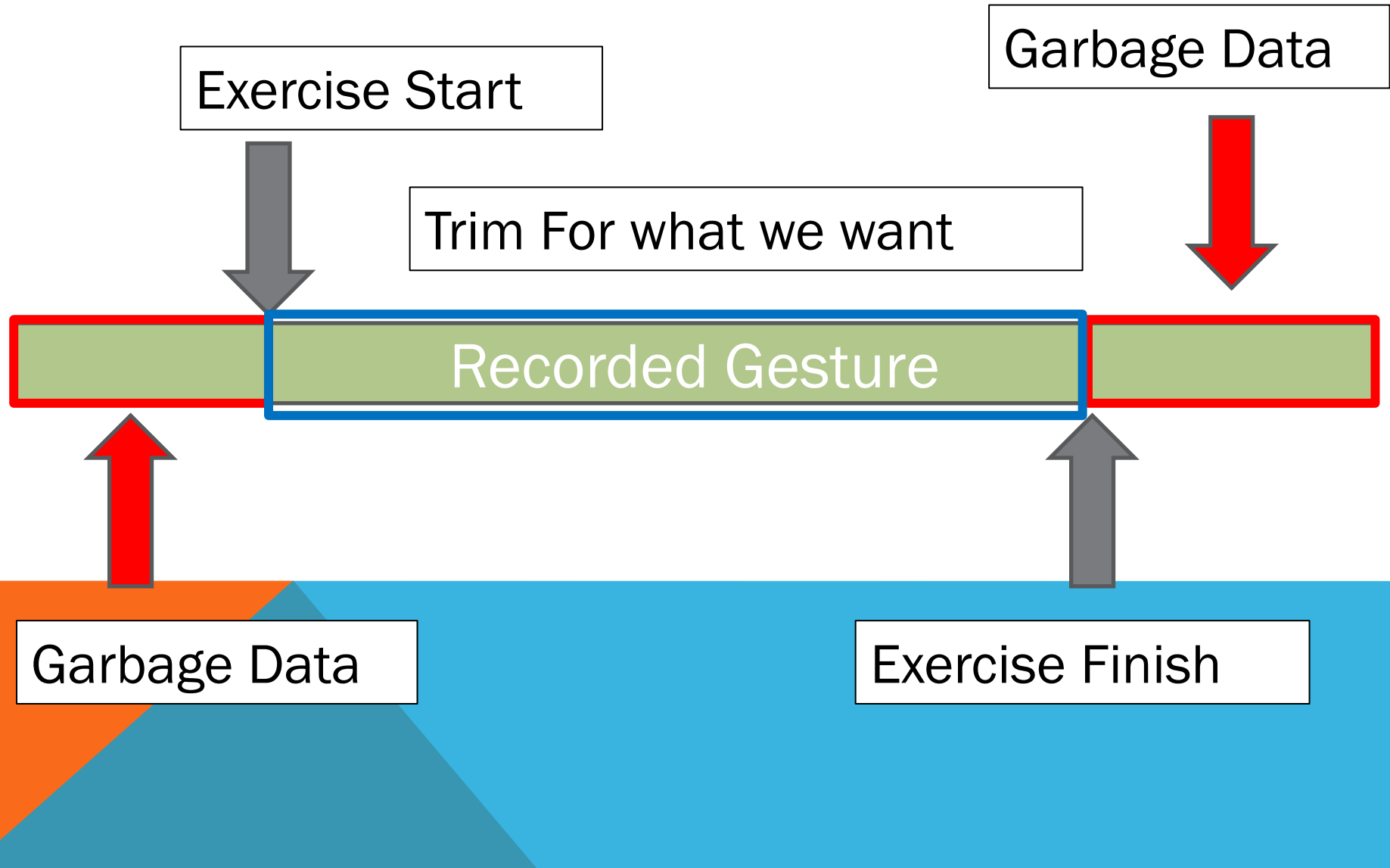
Save Skeletal animation with xn

Fixed Frame rate animation data

For 20skletal point .

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<MotionCapture numFrames="436">
  <Frame index="0">
    <Joints>
      <HipCenter x="0.004373774" y="-0.2085678" z="1.175934" />
      <Spine x="0.01166305" y="-0.1727222" z="1.140005" />
      <ShoulderCenter x="0.04311449" y="0.0005620689" z="0.966626" />
      <Head x="0.001056423" y="0.1555377" z="0.8977081" />
      <ShoulderLeft x="-0.1302091" y="-0.002748044" z="1.05836" />
      <ElbowLeft x="-0.1574984" y="-0.168891" z="1.139765" />
      <WristLeft x="-0.1309415" y="-0.3308955" z="1.171756" />
      <HandLeft x="-0.1182947" y="-0.3894909" z="1.183313" />
      <ShoulderRight x="0.1164801" y="-0.04364989" z="0.9720763" />
      <ElbowRight x="0.1964814" y="-0.1584586" z="0.8983378" />
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      <HandRight x="0.2139752" y="-0.3231923" z="0.7967898" />
      <HipLeft x="-0.05442362" y="-0.2373063" z="1.250308" />
      <KneeLeft x="-0.07110864" y="-0.5289798" z="1.262374" />
      <AnkleLeft x="-0.08681613" y="-0.7484342" z="1.25434" />
      <FootLeft x="-0.1067903" y="-0.797756" z="1.217159" />
      <HipRight x="0.04482886" y="-0.2758723" z="1.189239" />
      <KneeRight x="0.09530228" y="-0.4866974" z="1.320418" />
      <AnkleRight x="0.1452887" y="-0.682797" z="1.437495" />
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  </Frame>
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  <Frame index="17">...</Frame>
  <Frame index="18">...</Frame>
  <Frame index="19">...</Frame>
  <Frame index="20">...</Frame>
  <Frame index="21">...</Frame>
```

Editing function



Player Side

Key Feature

1. Ratio & Position Correction

1. Ratio Correction for different body.
2. Position Correction between Trainer skeleton and customer skeleton

2. Compare Algorithm

1. Compare by position difference
 2. Animation Compare
- 

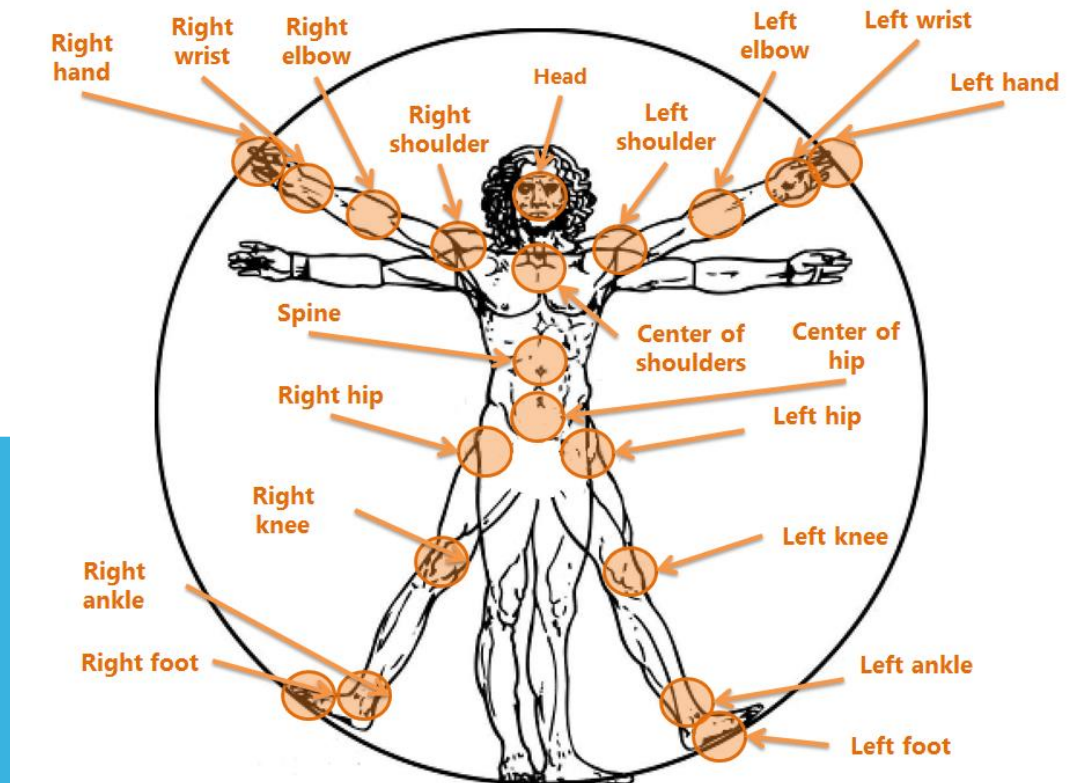
Ratio Correction for different body.

Position Data -> Vector Data

Change to relation between position

$(x,y,z) - (x,y,z) \rightarrow (x,y,z \text{ direction} + \text{length})$

Trainer Length Ratio -> Customer Length Ratio



Position Correction

Set a datum point.

⇒ depend on type of exercise.

Move Vector data and transform to position data.



Compare Algorithm

Threshold & Distance

if distance between position is smaller than threshold value.

(accuracy = 100%)

if distance between position is larger than threshold value. (accuracy = threshold/distance * 100)



COMPARE ALGORITHM

Accumulate accuracy by frame.

- 1. Make Accuracy array buffer (Initialized by 100%)**
- 2. Update accuracy per frame. And it's average value become exercise accuracy.**



SCHEDULE & WHAT WE DID

Task Name		W1 3/26~	W2 4/2~	W3 4/9~	W4 4/16~	W5 4/23~	W6 4/30~	W7 5/7~	W8 5/14~	W9 5/21~	W10 5/28~
T1	Research principle of Kinect Sensor & how to work with Skeletal data										
T2	Look for examples and papers about sequent skeletal data saving algorithm & comparing algorithm										
T3	Design data structure for sequent skeletal data										
T4	Design an algorithm to compare saved sequent skeletal data with user's sequent gesture										
T5	Implement an application to translate sequent skeletal data into data structure(file)										
T6	Implement an application to compare saved sequent skeletal data with user's sequent gesture and show the result										
T7	combine the two applications to form an integrated application										
T8	Debugging & Final Test & Write the final paper										

Common

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