

TUTORIAL 6A

Quintic[®]

1 for Sports Analysis

Tutorial 6a – Manual Digitisation

Contents

Calibration

Create Template

Digitisation Traces

1 point digitisation is available in Quintic Coaching, 21 point digitisation is available in Quintic Biomechanics.

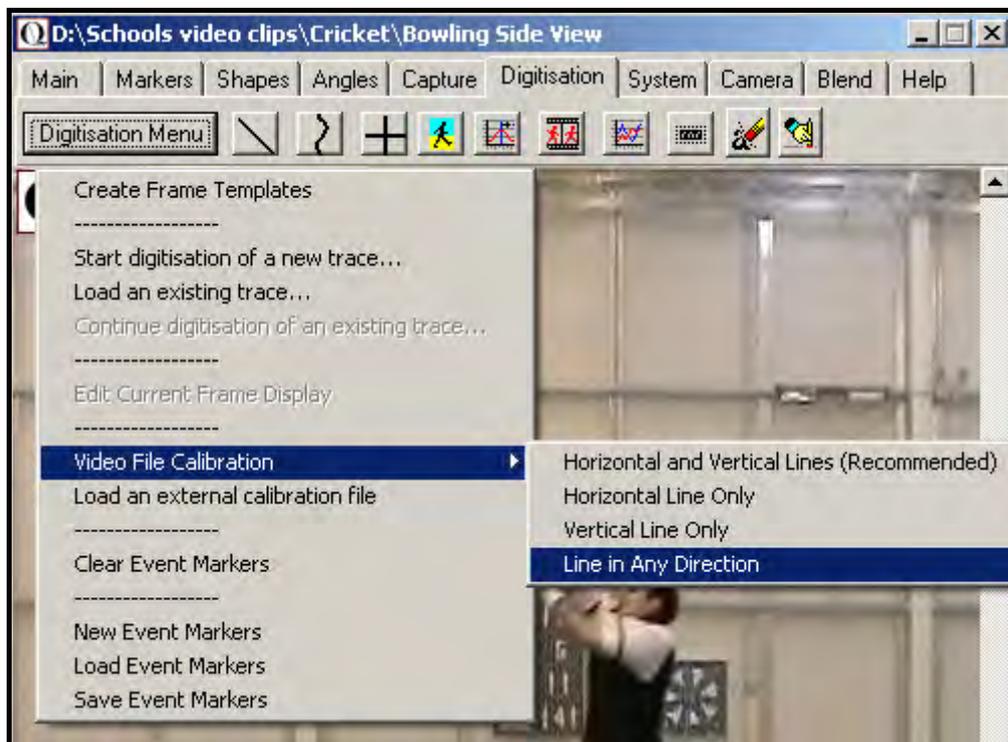
Digitisation allows you to track the location of certain parts of the body or pieces of equipment throughout the duration of a video clip. Quintic Biomechanics software can then calculate distances, velocities and accelerations of the joints you have tracked.

GO TO RECAP ON QUESTION SHEET

(PAGE 87)

Open the video ‘Bowling – Side view’ from the cricket folder.

Click on the ‘**Digitisation**’ tab and then on **Digitisation Menu**



1: Calibration

N.B Video calibration can only be performed in Quintic Coaching by using the ‘Shapes’ function (Tutorial 2) or ‘Line in any Direction’

To begin digitised analysis, you must **Calibrate** the video clip. This means that the computer can then convert a distance on the computer screen to its relative distance in the real world.

Either:

- a) Select **‘Video File Calibration’** from the drop down menu if you know the length of something that is part of the action (i.e. A javelin, cricket bat, leg length or stump height).

Choose one of the options presented:

- If you know certain distances in both the horizontal **and** vertical directions then choose **‘Horizontal and Vertical Lines’**,
- If only the horizontal distance is known then choose **‘Horizontal Line only’**
- If only the vertical distance is known then choose **‘Vertical Line only’** and
- If a distance is known then choose **‘Line in any Direction’**.

Hold the cursor over one end of the known distance, click the left mouse button and drag the cursor to the other end. Enter the distance and click **‘Accept’**

Or

- b) Select **‘Load an external calibration file’** if you have used the same background and camera position as a previous video that has already been calibrated.

NOTE: The camera must not have been moved between the times these two clips were filmed.

If the video playing within the software is of a higher frame rate than 50fps, after the video has been calibrated the user should select the **‘Video Recording Speed’** option from the digitisation menu. N.B. if the video has not been captured through Quintic occasionally the correct frame rate is not recognised, causing any inaccurate analysis.

To set the recording rate of a video select **‘Video Recording Speed’** from the digitisation menu. Now select the desired frame rate from the drop down menu. This will change the saved recording rate of the video allowing accurate analysis.

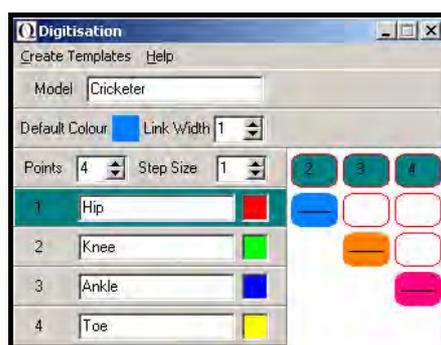
GO TO QUESTION 1, 2, 3, AND 4 ON QUESTION SHEET

(PAGES 87, 88 & 89)

2: Create a Frame Template

From the **‘Digitisation menu’** click **‘Create Frame Template’**.

There are a number of options to choose from:



Model: Name your model so that in the future you can use it again. Call it **‘Cricketer’**

Points: Select the number of places you are going to track in the movement. We are going to do 4. (If using Quintic Coaching the maximum amount of points you can select is 1)

Step Size: This states how many frames will be digitised (1 = every frame, 5 = every 5th frame etc). We will be doing every frame and so choose **‘1’**

Link Width: This is the width of the lines that join up the points. We want a very thin line so choose **‘1’**.

Point Name: You can change the names from **‘point 1’**, **‘point 2’** etc to specific names. We are going to track the joints of a leg so call your points **‘Hip’**, **‘Knee’**, **‘Ankle’** and **‘Toe’**.

Default colour: Left click on the coloured box next to **‘Default colour’** and select a colour from the palette. Now left click on the box next to the point names to transfer that colour. Follow the same procedure for all 4 points giving them different colours so they can be identified later in the analysis stage.

Link colours: Change the default colours and click on the boxes as in the example above. To remove the colours from one of those squares, right click on it. These boxes show which points will be connected to each other. We want to connect 1 to 2, 2 to 3 and 3 to 4; so we have put different colours in the boxes that are at the cross-points.

Click **‘Create template’** on the top-left of this window and click **‘Save As’**. Call it **‘Bowler leg – 4 point’** and save it in the **Cricket** folder. (CARE: This will replace any previous traces called this same name)

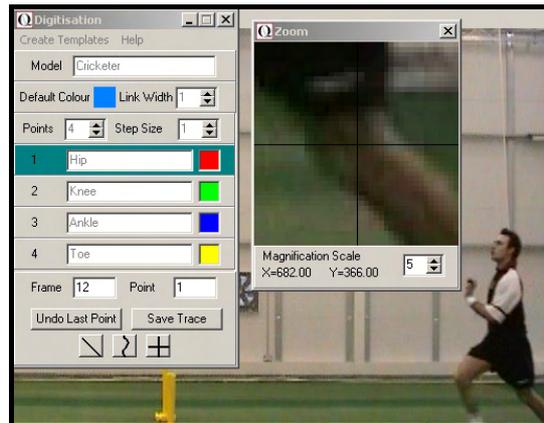
3: Start Digitising

In the Main window click on **'Digitisation Menu'** and then **'Start Digitisation of a New Trace...'**

A window may pop-up asking if you want to **'overwrite the existing trace'**. Click **Yes**.

Navigate to the cricket folder and open **'Bowler leg – 4 point'** template.

We are going to digitise the **left** leg of the bowler so scroll to the first frame in which their whole **left** leg is visible (**Frame 12**). Now we are ready to digitise!



As the cursor moves across the screen, the zoom window shows a larger version of the area under the cursor. Use this to pinpoint the exact locations of the hip, knee, ankle and toe. This must be done in the correct order and as accurately as possible.

If you make a mistake, click the **'undo last point'** button. After you have clicked on all 4 points a window will state, **'Frame completed. Accept Frame?'** If you have made a mistake on the final point click **'No'** and re digitise that point. If they are correct, click **'Yes'** and the video will automatically advance to the next frame ready for digitisation.

Continue to digitise until the bowler moves off the screen or until you do not wish to digitise any further then click **'Save Trace'**.



GO TO QUESTION 5 & 6 ON THE QUESTION SHEET

(PAGE 89 & 90)

Tutorial 6a – Question Sheet

RECAP

- 1) When capturing video footage what are the Trim In and Trim Out functions?

- 2) What is the maximum duration should capture in one go?

- 3) What is the name of the piece (hardware) that links the video camera to the computer?

- 4) What is the difference between capturing at ‘Half’ and ‘Full’ size?

BACK TO TUTORIAL SHEET

(PAGE 83)

Using the video ‘**Bowling – Side View**’ from the cricket folder

- 1) Calibrate the video by assuming that the bowler’s right forearm (elbow to wrist) is 0.3 metres long (draw vertical line in frame 19) and the base of the middle set of stumps is 0.2m wide (draw horizontal line).
- 2) Calibration measures the distance between 2 points on the video and relating this to the real life distance. Distances on video are measured in ‘**Digitising Points**’ (dp), which is the number of coordinate points it covers in the horizontal and vertical directions.
 - (i) Which letter represents coordinate measurements in the horizontal direction?

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 (ii) Which letter represents coordinate measurements in the vertical direction?

3) A scale is created which tells you how many metres are represented by 1 digitising point.

- (i) Use the scale **1dp = 0.1 metres** to calculate the real lengths of these objects:

Object	Lengths on video (dp)	Real lengths (m)
<i>Example: Rugby ball length</i>	3	
Cricket bat	9	
Rugby player's shoulder width	4	
Football goal width	70	
Netball post height	3.05	
Cyclist's lower leg	3.5	
Hockey stick	10	

- (ii) Can you use the scale **3dp = 0.15metres** to calculate the real lengths of these objects.

(Hint: it may help to change this scale to work out how many metres are represented by 1 digitising point.)

Object (NO VIDEOS REQUIRED)	Lengths on video (dp)	Real lengths (m)
<i>Example: Ballet shoe</i>	4	0.26
Long jump pit	105	
Diving platform height	150	
Tennis ball	1.5	
Basketball net diameter	6.75	
Javelin length	15	
Trampolinist's hip width	6	

- 4) Can you calculate the scale when given the lengths on video and in real life in these examples? This time calculate the scale by working out how many digitisation points represent 1 metre – ‘1m = ?? dp’

Object (NO VIDEOS REQUIRED)	Lengths on video (dp)	Real lengths (m)	Scale
<i>Example: long jump</i>	180	6	1m: 30dp
Diving board length	50	5	
Volleyball net height	300	3	
Cricket stump	20	1	
Kayak paddle	50	2.5	
Rowing oar	70	3.5	
Squash racket	125	1.5	

- 5) Imagine you have digitised video clips of two different swimmers performing the same stroke. Explain why it is important to calibrate both clips in order to compare the speeds of the two swimmers.

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BACK TO TUTORIAL SHEET

(PAGE 85)

Open the video **Sprint Start'** from the athletics folder.

- 6) You are going to digitise one complete cycle of the runner's left leg.
 (i) At which frames are you going to start and finish your digitisation?
 Justify your answer.

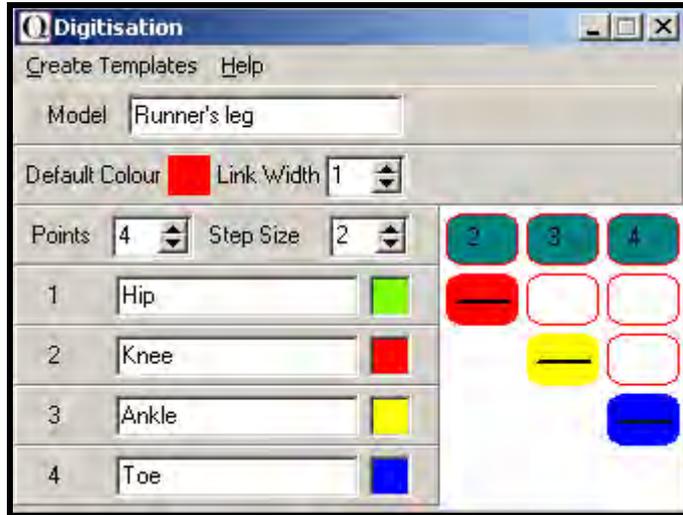
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- (ii) Create this template for your digitisation. (If you are using Quintic Coaching create a 1 point template and trace a point of your choice).



- (iii) Why can't you continue to digitise after frame 65?

- (iv) Which point do you think will show the greatest peak values of Horizontal Velocity – hip, knee, ankle or toe? Explain your answer.

- (v) Which point will show the lowest peak values of Horizontal Velocity throughout the stride – hip, knee, ankle or toe? Explain your answer.

Tutorial 6a - Answer Sheet

RECAP

- 1) When capturing video footage what are the trim in and trim out functions?
Trim in and Trim out and allow unwanted frames to be removed from the captured film making sure you only save the frames you really need.
- 2) What is the maximum amount of time for which you should capture in one go?
No more than 60 seconds.
- 3) What is the name of the piece of equipment that links the video camera to the computer?
Fire wire.
- 4) What is the difference between capturing at 'Half' and 'Full' size?
You can capture no more than 60 seconds at a time when using the video capture size FULL. If you are capturing at HALF size you can capture for as long as you like.

BACK TO TUTORIAL SHEET

(PAGE 83)

QUESTIONS

Using the video '**Bowling – Side View**' from the cricket folder

- 1) Calibrate the video by knowing that the bowler's right forearm (elbow to wrist) is 0.3 metres long (draw vertical line in frame 19) and the base of the middle set of stumps is 0.2m wide (draw horizontal line).
- 2) Calibration works by measuring the distance between 2 points on screen and working out how far this is in real-life. Distances on screen are measured in 'digitising points' (dp), which is the number of coordinate points it covers in the horizontal and vertical directions.
 - (i) Which letter represents coordinate measurements in the horizontal direction? *X coordinate*
 - (ii) Which letter represents coordinate measurements in the vertical direction? *Y coordinate*
- 3) A scale is created which tells you how many metres are represented by 1 digitising point.

- (i) Use the scale **1dp = 0.1 metres** to calculate the real lengths of these objects:

Object	Lengths on video (dp)	Real lengths (m)
<i>Example: Rugby ball length</i>	3	0.3
Cricket bat	9	0.9
Rugby player's shoulder width	4	0.4
Football goal width	70	7.0
Netball post height	3.05	3.05
Cyclist's lower leg	3.5	0.35
Hockey stick	10	1.0

- (ii) Can you use the scale **3dp = 0.15metres** to calculate the real lengths of these objects.

(Hint: it may help to change this scale to work out how many metres are represented by 1 digitising point.)

Object	Lengths on video (dp)	Real lengths (m)
<i>Example: Ballet shoe</i>	4	0.26
Long jump pit	105	7
Diving platform height	150	10
Tennis ball	1.5	0.1
Basketball net diameter	6.75	0.45
Javelin length	15	2.1
Trampolinist's hip width	6	0.4

- 4) Can you calculate the scale when given the lengths on video and in real life in these examples? This time calculate the scale by working out how many digitising points represent 1 metre – '1m = ?? dp'

5)

Object	Lengths on video (dp)	Real lengths (m)	Scale
<i>Example: long jump</i>	180	6	1m: 30dp
Diving board length	50	5	1m 10dp
Volleyball net height	300	3	1m 100dp
Cricket stump	20	1	1m 20dp
Kayak paddle	50	2.5	1m 20dp
Rowing oar	70	3.5	1m 20dp
Squash racket	125	1.5	1m 83.333dp

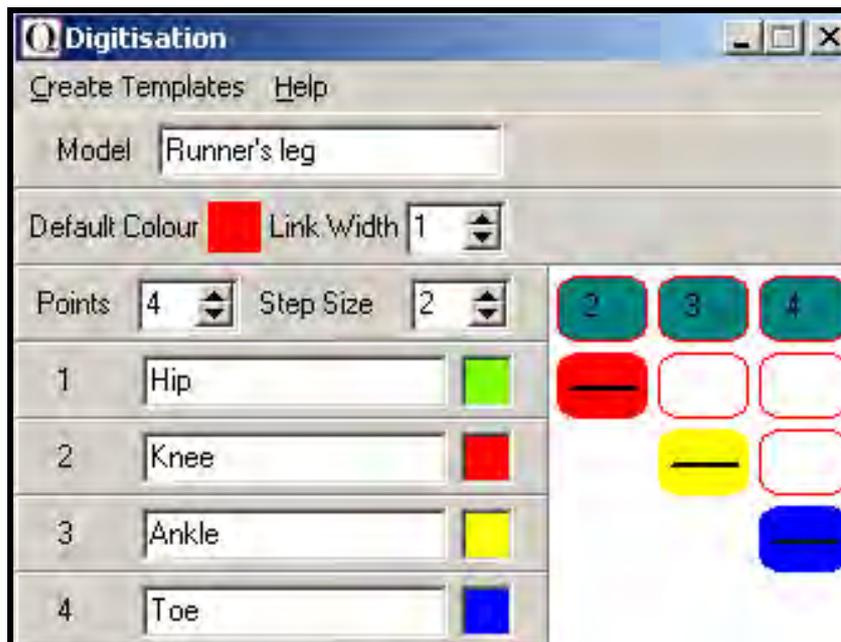
- 6) Imagine you have digitised video clips of two different swimmers performing the same stroke. Explain why it is important to calibrate both clips in order to compare the speeds of the two swimmers.
Both clips must be calibrated as the swimmers will have different limb lengths, the swimmers may have different techniques as well.

BACK TO TUTORIAL SHEET

(PAGE 85)

Open the video 'sprint start' from the athletics folder.

- 7) You are going to digitise one complete cycle of the runner's left leg.
- (i) At what frame numbers are you going to start and end your digitisation? Justify your answer.
You would use frames 50-62 to digitise the sprinters movement. This is from the set position (where he firsts start's to move) to frame 62 left toe contact with the floor
- (ii) Create this template for your digitisation.



- (iii) Why can't you continue to digitise after frame 65?
You cannot continue to digitise after frame 65 as after this point the camera starts to pan sideways. Therefore no data (velocities, accelerations) would be able to be generated.

- (iv) Which point do you think will show the greatest peak values of horizontal velocity – hip, knee, ankle or toe? Explain your answer. *The joint with the greatest value of horizontal velocity will be the athlete's toe. This is because velocity = distance / time. As the toe has the furthest distance to travel in the same time increment. Also the toe is where the majority of the running force is generated through so during toe off.*
- (v) Which point will show the lowest peak values of horizontal velocity throughout the stride – hip, knee, ankle or toe? Explain your answer. *The joint with the lowest velocity is the toe as during the swing phase of the gait movement the leg is returning to the start position. Therefore there is no large force acting upon the foot or toe.*