2D/3D VIDEO MOTION ANALYSIS SYSTEM

CABC'S India

MOTION ANALYSIS

Frame-DIAS

ABUNDANT ANALYSIS FUNCTIONS

- Motion analysis from frame or field-by-field images
- Stick picture display connecting analysis points
- Linking with video files
- Linking graphs of various analysis items, etc.
- Import of motion capture data from other companies
- Importing floor reaction force data
- Saving video files of stick pictures and graphs

COMPATIBLE WITH VARIOUS MEASUREMENT ENVIRONMENTS

- Motion analysis without marker
- Analysis of actual sports environments
- Operation outdoors
- Wide range of motion

SYSTEM CONFIGURATIONS THAT CAN BE SELECTED ACCORDING TO BUDGET AND APPLICATIPON

- Digitize
- Digitize & 2D Analysis
- Digitize & 3D, 2D Analysis

You can choose from a total of 6 types, including the above 3 configurations above and the “Slide shot option” added.

You can also Possible to upgrade incrementally.

FIELD OF USE

Action in a field of Sports Biomechanics and game analysis

Automatic analysis is impossible when it comes to motion analysis during dynamic sports involving body rotation, especially during outdoor games.

A video recording method like this system is the best.

Utilisation in a field of Rehabilitation, Functional Disorders & Gait Analysis

This system, which can automatically digitize markers, can be installed at a fraction of the price of a fully automated motion capture system.

There is also the advantage of being able to analyze images taken in other locations or outdoors, as it does not matter where the images were taken.

ADDITIONAL FEATURES

- AI (Artificial Intelligence) Digitize (13 Joint points can be obtained)
- Video cache function (Comfortable processing of high-definition video)
- 3D CC method (realise calibration with a minimum of 3 points)
- Autodetection of sync points (Automatic detection of synchronizer issue)

Frame-DIAS

30 years supported by many researchers!
Sales performance to more than 1,200 Users in Japan

Today, motion analysis systems and motion capture systems are applied in various fields such as sports biomechanics research, ergonomics, and video production for movies and games.

In addition, they are roughly divided into those that perform fully automatic measurement indoors and those that can shoot anywhere indoors or outdoors.

This system adopts the latter method and supports motion analysis in a wide range of fields with a manual/automatic combined system. With the latest version of Frame-DIAS6, AI support enables automatic acquisition of 13 joint point marker coordinates (using dedicated analysis equipment and dedicated markers).

UTILIZATION IN THE FIELDS OF ERGONOMICS, AUTOMOBILES, AND ROBOTICS

There are situations in which large-scale recording equipment such as optical motion capture cannot be installed in experiments, laboratories, and workshops. Since this system is only a camera, it has a high degree of freedom in installation and does not require a dedicated space.

APPLICATIONS IN THE FIELD OF BIOLOGY AND INSECT/-ANIMAL BEHAVIOUR

If the movement is slow and cannot be observed all the time, a video recording method like this system is the best option. You only shoot on site and can analyze them while checking them later. The automatic digitizing may be possible that if the tracked object has a clear contrast for against the background.

Analysis of shaking/vibration of bridges・structures・ships・and vehicles・animation creation・computer graphics ・facial expression analysis・jaw movement analysis

Digitize

Digitizing Program

Basic Program for Calculating Spatial Coordinates from Video

More Convenient! More Comfortable!

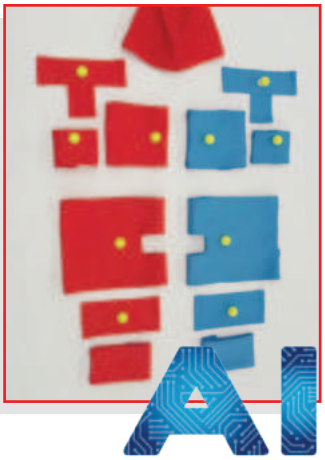
This reduces the burden of digitizing and shortens the processing time.

VIDEO CACHE FUNCTION

The processing speed of digitizing has been improved by caching the video on the hard disk.
Even high-resolution 4K video can be comfortably digitized and frame-by-frame

AUTOMATIC DETECTION OF SYNCHRONIZATION POINTS

You can digitize by thinning out frames at equal or irregular intervals. Reduce waste by digitizing only critical phases and points in time, such as grounding and takeoffs. You can also interpolate gaps in spaced digitized data to get continuous data.

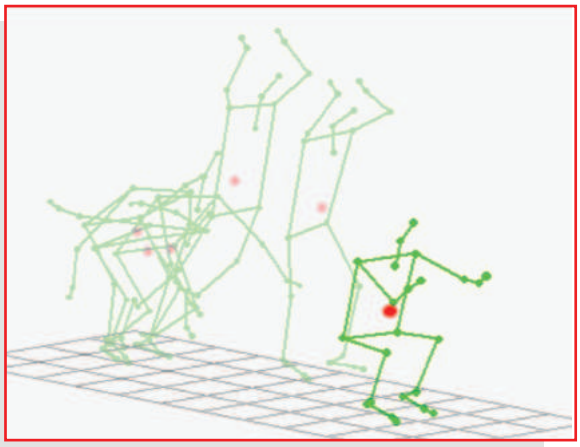


AI DIGITIZATION

It is a function that automatically extracts 13 joint points by using a dedicated marker and a dedicated arithmetic unit, and can even digitize it. By combining posture estimation by AI and image recognition of special markers attached to the body, we have improved processing speed without sacrificing digitizing accuracy.

STICK PICTURE DISPLAY

Even with the digitizing software alone, the 2D and 3D original coordinate calculation results can be visually displayed and played back as stick pictures. With the 3D analysis system, you can rotate and check the movement from any direction and angle. The shape, size, type of connection, thickness, and color of points can be customized, and movement trajectories can be displayed and video files can be saved. It can also be used for checking data and making presentations.



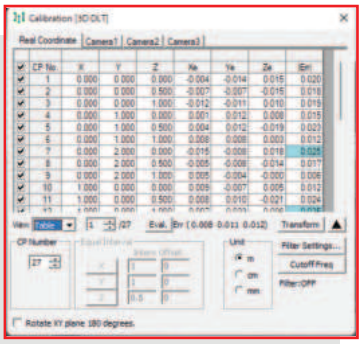
SAVE LABOR BY THINNING FRAMES

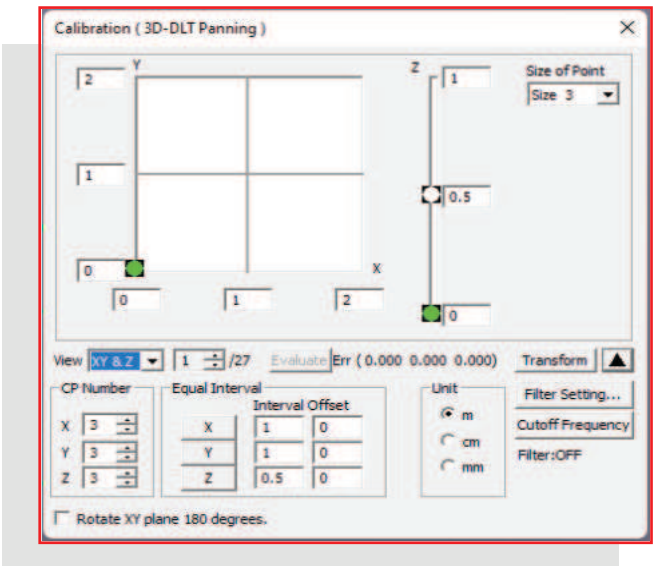
You can digitize by thinning out frames at equal or irregular intervals. Reduce waste by digitizing only critical phases and points in time, such as grounding and takeoffs. You can also interpolate gaps in spaced digitized data to get continuous data.

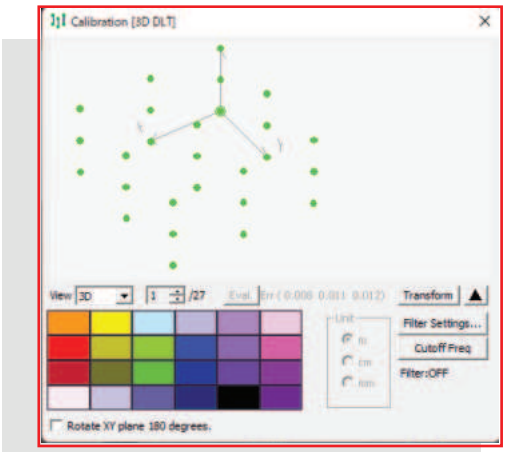
EASY-TO-UNDERSTAND CALIBRATION

The visually intuitive interface ensures error-free calibration.

*The posted image is the 3D DLT method.
In 3D analysis, you can rotate the stick picture on the 3D screen.
If you match the direction of the camera image, it will be easier to imagine the arrangement and order.







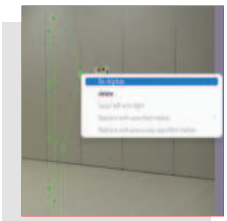
3D Display

AUTOMATIC TRACKING, MANUAL IS ALSO FULFILLING

Color recognition has been added to the conventional binarization automatic digitizing that distinguishes between markers and surrounding brightness. Automatic digitizing becomes more convenient because you can use it according to the situation.
The manual digitizing function, which can be analyzed without markers, can also be used for image enlargement, position prediction, and reverse playback. Functions such as trajectory display and auxiliary line display enable more reliable digitizing, even for complex movements where markers are hidden. In 3D processing that requires digitized data from two or more cameras, the time data digitized from two or more cameras are displayed in different colors, so you can see at a glance where digitization is insufficient. Missing data can also be interpolated.

DIGITIZING AUXILIARY FUNCTION

CORRECTIVE DIGITIZING



You can re-digitize the position of the digitized coordinates by operating the mouse, delete it, and replace it with the left/ right/ specified marker.

VIRTUAL CP DISPLAY

This function displays the calibration control points (CP) used in the current frame during panning digitizing.
This allows you to check if you have enough CP for calculating coordinates.
* Can only be used during panning digitizing.

DIGITIZE EXTENSION LINE

This is a function that displays a line that passes over the point of interest.

Auxiliary lines let you infer marker locations.

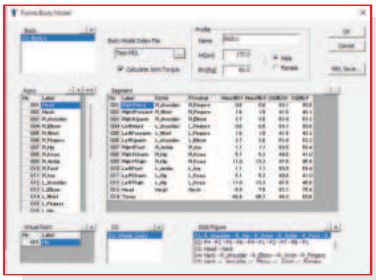
* Display conditions are that 3D analysis, calibration, and digitization have been completed with another camera at the same time.

Locus display

This is a function that displays the trajectory of the point of interest. By displaying the trajectory, it becomes easier to guess the marker position from the movement of the marker back and forth.

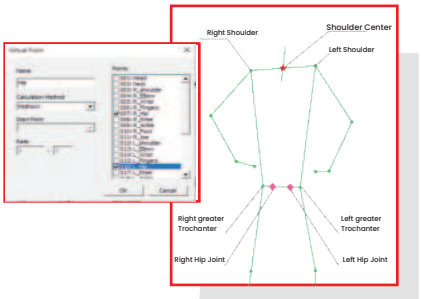
MODEL SETTINGS

A body model can be applied to multiple subjects in the same file. You can add up to 4 body models.



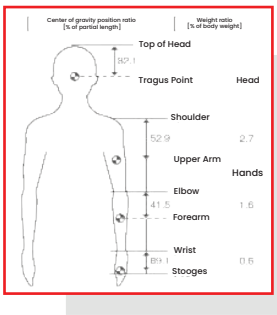
BODY MODEL OF MULTIPLE SUBJECTS

When multiple test subjects are included in one file (match, doubles, pair, defense/offense, etc.), a body model can be applied to each.



VIRTUAL POINT

It can be created by arithmetic operations on existing point coordinates. It can be used for estimating joint centers and parts without markers.



BSP EDIT

Body part inertia coefficients can be edited.

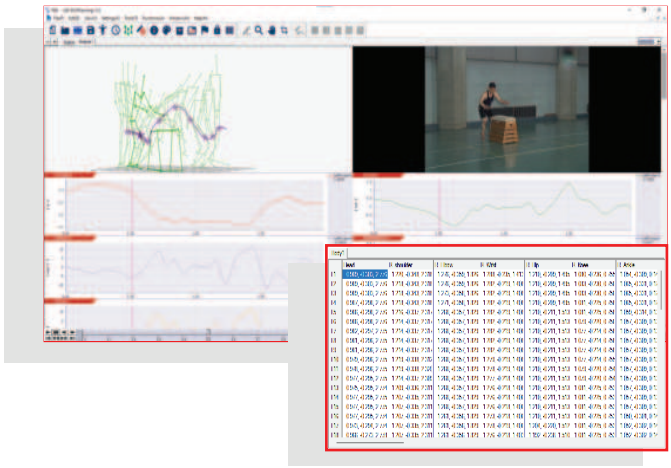
Weight ratio and center of gravity ratio can be entered for each gender.

Analyze

2D/3D Analysis Program

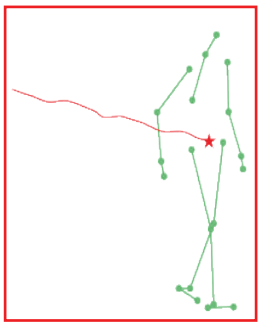
Based on digitized displacement data, in addition to kinematics analysis of velocity, angle, center of gravity, etc., it also supports kinetics analysis linked to force plates.

The 3D Analysis Program includes 2D Analysis.

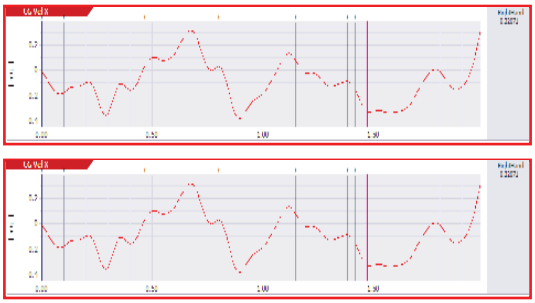


The interface resembles a folder structure called "containers" and provides an intuitive screen representation that is easy to understand.

GRAPH INTERFACE



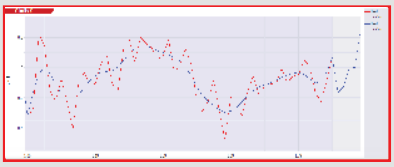
Time-series graphs of analysis values are linked with stick pictures, table of coordinate values, and camera images. With simple mouse operations, you can change the scale of the vertical and horizontal axes, scroll, select ranges, and insert events. An interface similar to a folder structure called a container was adopted to realize an easy-to-understand and intuitive screen representation.



With filter: Butterworths (cutoff frequency 6Hz, data extension 20)

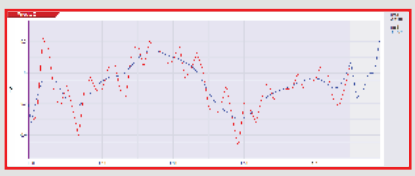
CENTROID ANALYSIS

Calculate the partial center of gravity of the body and the combined center of gravity. The center of gravity position is displayed on the stick picture, and the trajectory and afterimage can also be displayed. The movement of the center of gravity, which is the representative point of the body, simply expresses the movement.



NO SECTION SPECIFIED

The graph is affected immediately after the meet and the graph is disturbed.



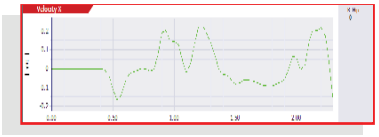
SEGMENT DESIGNATION AVAILABLE

The interval is divided into two phases
The graph is not disturbed because interval is specified.

BASEBALL BATTING BAT HEAD SPEED

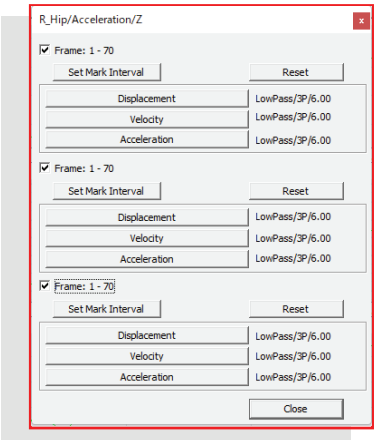
After filter: red
Before filter: blue

EVENTS



You can define a point in time by a time event.
You can define aspects depending by a time range event. By measuring the two-dimensional position of the player, the trajectory on the field can be displayed.
In the case of a wide field such as soccer, the entire field can be covered by using two cameras. In addition to the trajectory display, it can also be used for tactical analysis, etc., as it can calculate movement speed, etc., and link the camera image with the trajectory.

SMOOTHING DATA WITH FILTER FUNCTION



The filter can be selected from 3-point moving average and Butterworth type.

Automatic Determination of Cut-Off Frequency

Any cutoff frequency can be entered. There is also a function that automatically determines the optimum value when you do not know how many cutoff frequencies you can set.

*This is a function of the digitizing program.

Both End Correction

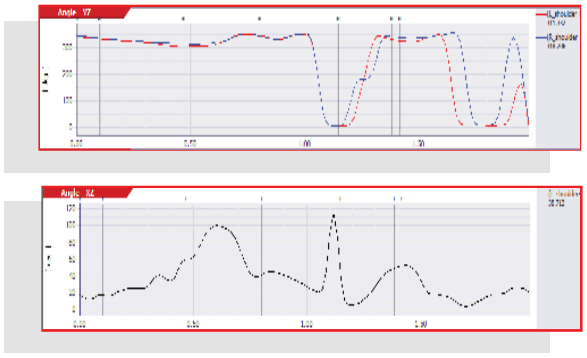
With the Butterworth type, correction to eliminate data distortion at both ends, "both ends correction" can be performed.

Segment Designation

In cases such as when applying a filter to the entire graph is disturbed the graph, you can limit the interval and smooth it. You can specify up to 3 segments.

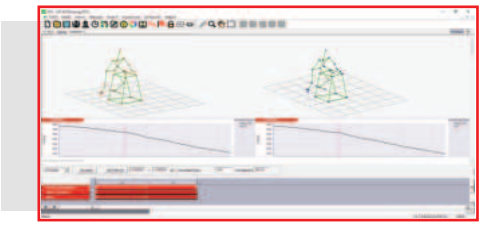
*See "Example" on the right.

FLEXIBLE ANALYSIS FUNCTION



Custom calculations using original formulas.
Calculated graphs can be added, subtracted, or integrated.
In the example in the figure, the difference in right knee joint angle is taken.

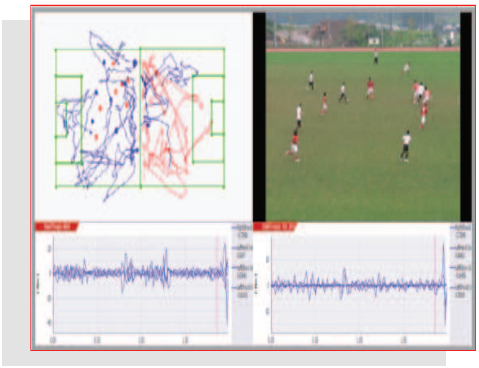
ATTEMPT COMPARISON OF MULTIPLE PEOPLE BY STANDARDIZATION



You can display the data of multiple trials side by side and calculate straddle for attempts.
When comparing multiple attempts, it is possible to align the number of data to the same length and synchronize time.
This makes it possible to compare different aspects depending on the subject and attempt.

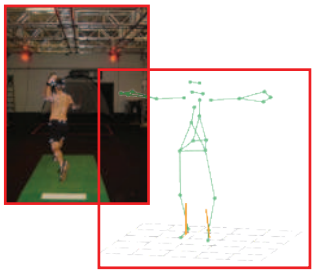
MOVEMENT TRAJECTORY AND TACTICAL ANALYSIS

By measuring the 2D position of the players, the trajectory on the field can be displayed.
In the case of a wide field such as soccer, the entire field can be covered by using two cameras. In addition to the trajectory display, it can also be used for tactical analysis, etc., as it can calculate movement speed, etc., and link the camera image with the trajectory.



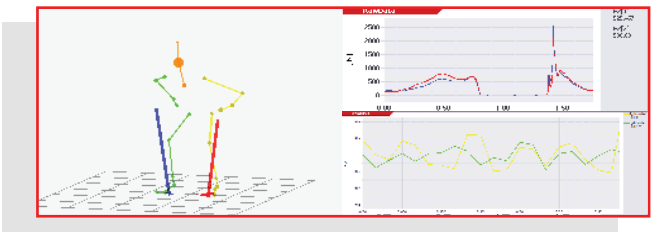
C3D DATA

Data from motion capture (VICON, etc.) can be read and analyzed.



IMPORT

Data measured by other applications can be read.



Floor Reaction Force/Joint Torque

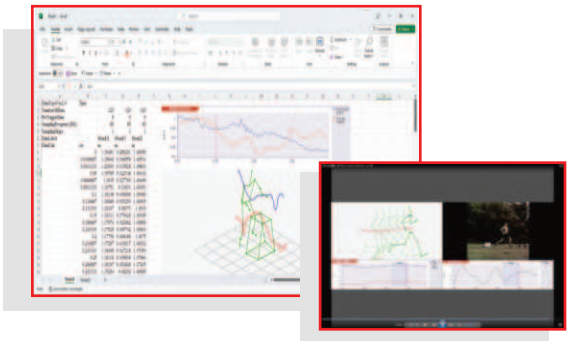
Floor reaction force data is read and displayed as a vector on a stick picture. Visually understand the point of force action.

The point of force action can be visually understood. In addition, joint torques of the upper and lower limbs can be calculated. Joint torque is a measure of muscle tension.

It is useful for analyzing technique and load.

EXPORT

Data created with Frame-DIAS can be used in other applications.



Utilization of Analysis Results

Coordinate values and analysis values can be saved in a text file or copied and pasted for processing with spreadsheet software. Stick pictures and graphs can be output as still images or movies, so they can be used in presentation software. You can also convert data to C3D, DIFF and BVH formats.

Ground Reaction Force/Joint Torque

Load the ground reaction force data and display the vector on the stick picture. You can visually understand the point of action of the force. It can also calculate the joint torque of the upper and lower limbs. Joint torque is used as a measure of muscle tension and is useful for analysis of technique and load.

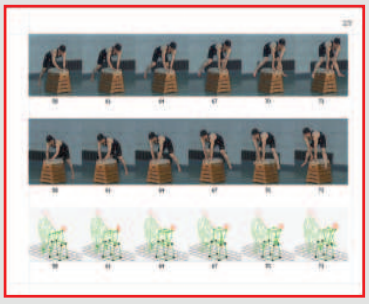
SlideShot Option

An option to create a series of photos from video footage and stick pictures.
It can be used for giving feedback to athletes, comparing forms of multiple subjects, writing papers, etc

You can freely choose a page layout that folds at the edge of the paper when printing, or a parallel layout that flows sideways like roll paper, according to your purpose. From the video, the start frames and end them for the capture, and you can capture continuous photos to specifying the number of frames to skip.

In addition, you can add or delete frames from after, change the number of skipped frames, select the direction of the paper and the direction of the slide, and change the size of the slide shot in 9 steps.

Also, by trimming, it is possible to specify the area of the image and create a series of photos.



PARALLEL LAYOUT

You can also use parallel layouts to mix video and stick pictures, or compare multiple camera videos side by side.

MANUAL TRIMMING

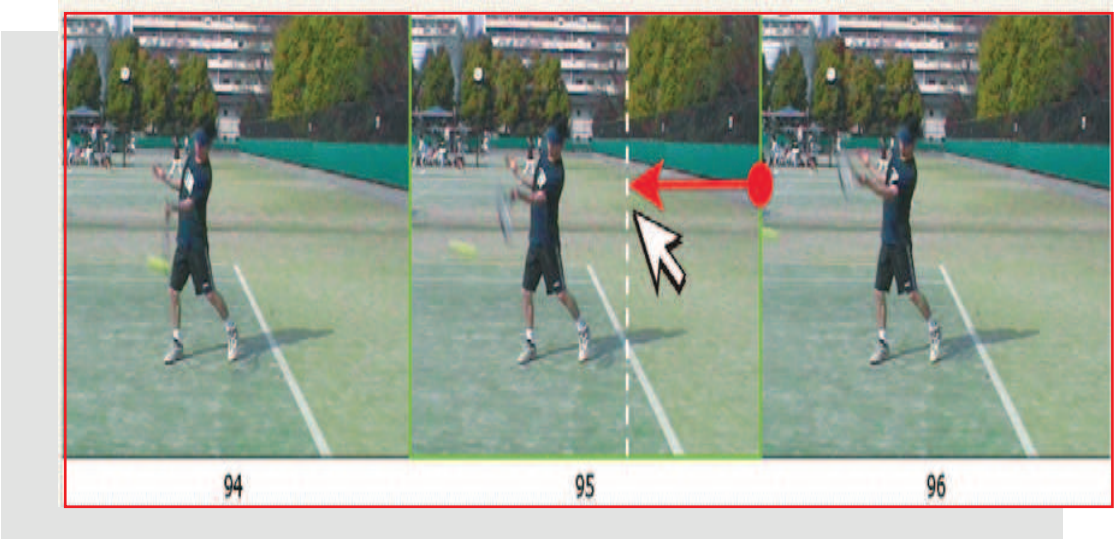
The trimming range is determined by enclosing the trimming range with the mouse.

AUTOMATIC TRIMMING

You can refer to the digitized data and perform automatic trimming. An automatic trimming frame is set for each frame.

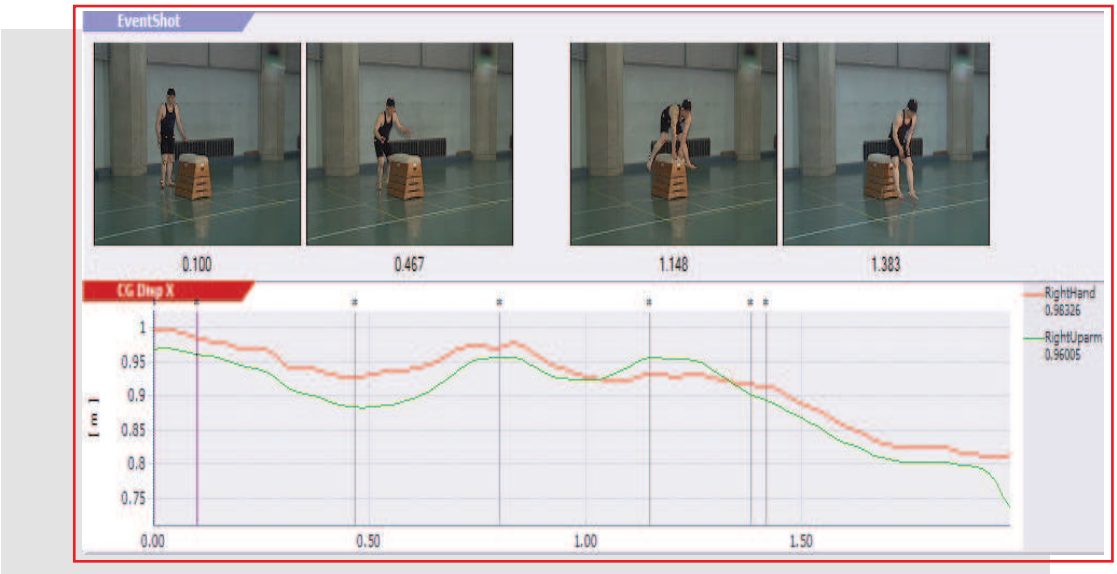
TRIMMING ADJUSTMENT

After importing, you can adjust the trimming by expanding or contracting the frame of the shot by dragging the mouse.
As a result, you can freely trim and adjust each photo.



EVENT SHOT

You can arrange still images of specified frames and stick pictures. 2D/3D analysis programs can also be arranged on top of graphs. Waveforms and still images can be viewed at the same time at the phase you you want to pay attention to.



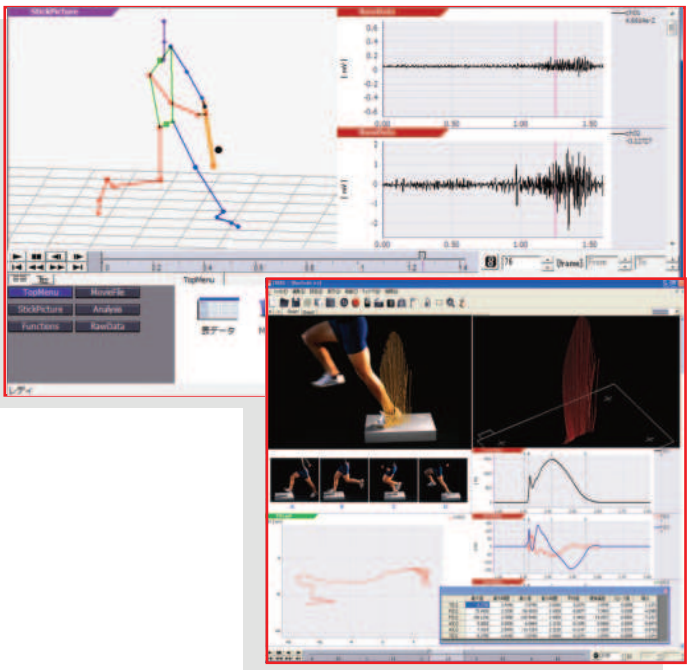
AD Conversion

TRIAS System & ForcePlate

By using the TRIAS System (our AD conversion and video total measurement system) together, AD conversion that is completely synchronized with the frame rate of the camera being recorded is possible.

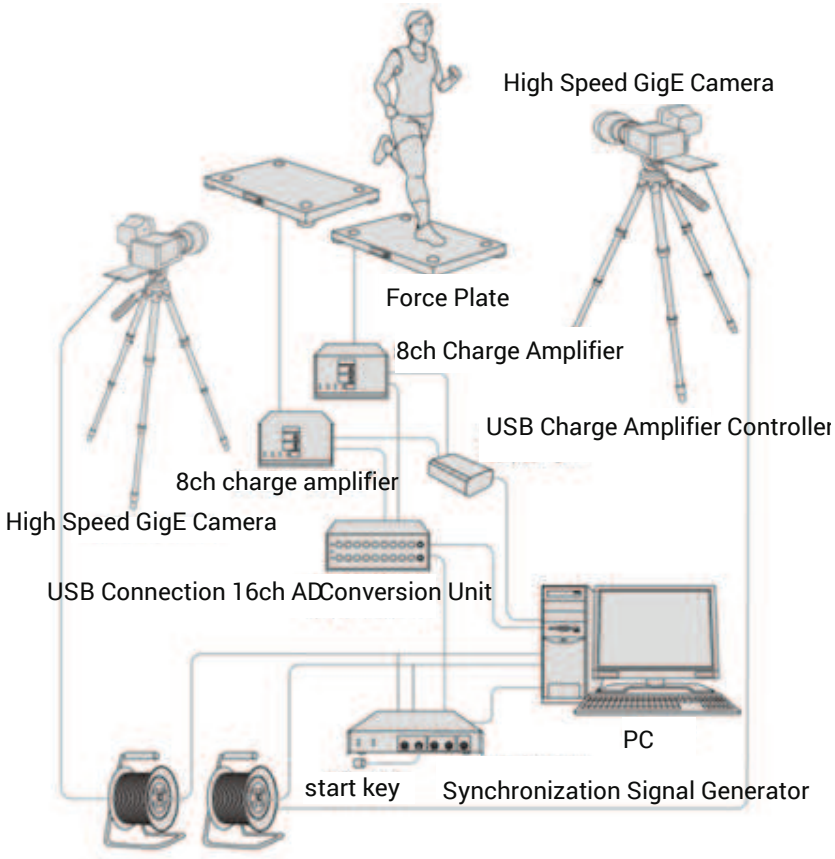
In order to calculate the joint torque of the lower limbs, it is necessary to measure the force plate in synchronization with the camera.

The Frame-DIAS image and various AD conversion waveforms measured by the TRIAS System can be display interlocking. In addition to ground reaction force meters, he is capable of motion analysis combined with EMGs, goniometers, force-sensors, and more.



CONNECTION CONFIGURATION EXAMPLE

3D analysis by synchronizing images and ground reaction force with 2 high-speed cameras and 2 force plates.



DEVICES THAT CAN BE LINKED

Force Plate

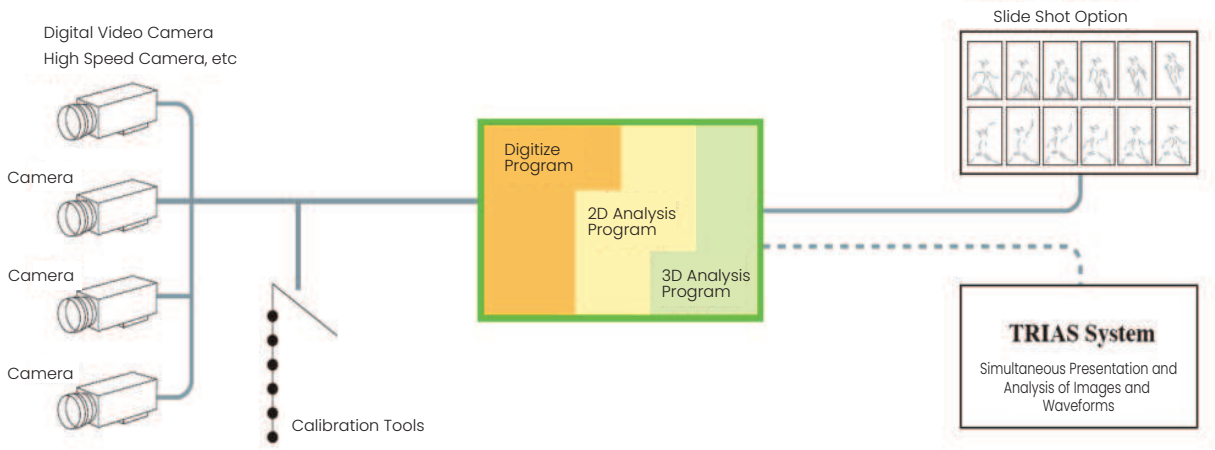
DataLITE Wireless Gonio EMG

Pressure Sensor

System/Spec/Option

Optional Feature: Slide Shot

SYSTEM CONFIGURATION DIAGRAM



OPTION

High-Speed GigE Camera [PH-1451/300]

It connects to his GigE camera dedicated port on a PC and records the images in the computer's memory. The resolution is 640 x 480 pixels, and it is possible to shoot at camera speeds of up to 300fps.

Long Length Calibration Device [PH-1600L]

Suitable for calibrating measurement spaces that require height, such as pole vaulting and volleyball measurements. It can be extended up to about 6m with a combination of 1.5m x 4.

TRIAS System (AD Conversion & Video Measurement System)

This system can simultaneously display and analyze graphs and video images by capturing video images synchronized with AD conversion of signals. Frame-DIAS can analyze the imported analog data and video.

Holding Pole Type Calibration Device [PH-1620]

It can cover height of about 2.5m. (1.2m * 2). Tool-free assembly simplifies calibration.

Hanging Calibration Device[PH-1600A]

The PH-1600A can cover a height of approximately 2.5 m. Six markers are standard, and the marker mounting bar is made of carbon pipe with a two-fold structure to prevent warping.

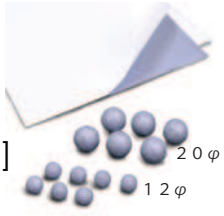
Wireless LED Synchronizer (2ch / 3ch / 4ch type)
[PTS-166/PTS-167/PTS-168]

It uses the same LED emitter as the PTS-110 type. A start signal is sent wirelessly from the transmitter body, and multiple light emitters are illuminated at the same time. Eliminates the hassle of long cable wiring that was complicated until now. Up to 10 receivers (LED emitters) can be used with one transmitter.

Wireless Ambient Light Presenter [PTS-159]

A device that projects light to indicate the same point in time for multiple video cameras. It can be illuminated in 360-degree directions, so all you have to do is place one in a place where it can be seen from all cameras. A wired version (PH-145) is also available.

Reflective Marker Set [PH-1810B]



A set of spherical reflective markers and reflective film for automatic digitizing. When exposed to light from near the video camera, it glows brightly, so automatic digitizing can be performed smoothly. Use double-sided tape to attach to the point to be measured. There are 2 sizes of markers, 12mm and 20mm in diameter.

Reflective Marker Set with Base
[PH-1600L]

This is the PH-1810B reflective marker version with a base. Since the adhesive area is large, it becomes difficult to peel off. The 12mm has a 10mm base and the 20mm has a 16mm base.

Color for AI Digitizing Marker Set [PH-1580]

A dedicated marker set for AI digitizing. It is a special marker for specifying the part of the extraction point and must be equiped when AI digitizing.

SOFTWARE SPECIFICATION

Digitizing Functions

- Position prediction function, reverse digitizing, digitizing aid lines, color adjustment around the cursor, magnification around the cursor
- Spot digitizing, simultaneous display of multi-camera AVI files
- Video cache, automatic extraction of sync points

Cursor : Arrow/ Cross/ Square/ Circle

Digitize Mode : Manual, Binarize, Color, Drag, AI, Correction

Automatic/Manual Switching : One-touch switching with keyboard or mouse

AVI Saving of Stick Pictures

- Stick picture in digitize mode and image are overlapped and saved.
- Save stick pictures of 2D and 3D analysis, save stick pictures and graphs in conjunction.

Standardization・Averaging

Normalization of time axis, mean of multiple data, standard deviation

Event

Time definition by time event, phase definition by time range event

Binarization: Frame size, level upper limits, lower limit can be specified.

Color : Frame size, hue range can be specified.

Analysis Frequency: Standard video: 60Hz, 30, 15... And frame drop

Camera speed can be specified for high-speed camera

Number of Cameras: Maximum 8

Image resolution Standard 720 × 480, maximum 3840 × 2160 pixels

Acquisition Data Length: Pixel unit co-ordinate value, up to 1 decimal place

Maximum Number of Data: number of points 200,number of data 216,000

Virtual Point Calculation: Midpoint, Internal Division Point, External Division Point, Center of Hip Joint

2D Coordinates Method: 4-point real length conversion, 4-point panning method, 2D DLT method,2D panning/tilting, multi-camera 2D DLT method

3D Coordinates Method: 3D DLT method, 3D panning/tilting method, 3D CC method

Number of Calibration Points: 2D (4 point converted to actual length) is 8 points

4 to 600 points for 2D DLT method

6 to 600 points for 3D DLT method

3D Coordinate System: Right-handed system

Interpolation of Coordinates

Spline Interpolation, linear Interpolation

Filter

3-point moving average, Butterworth filter, point-by-point, automatic determination of cutoff frequency, interval setting (up to 3 intervals)

Stick Picture Design

Display (3D, XY, YZ, XZ plane projection), points (color, shape, size), grid, locus (display switching, size), line (color, line type, thickness), afterimage (number, display interval, display point specification), fixed display of any point, floor reaction force vector (length, thickness, COP)

2D, 3D Analysis Setting Items

Center of Gravity	Body part coefficient file suitable for the subject can be selected from Matsui, Abe, Yokoi, Okada, Chandler, Clauser, and Harless coefficients.
Force Plate Settings	(Vector display on stick picture, used for torque calculation)
Model Settings .	Edit body part inertia coefficients, point names, and wiring, and save them all at once

Calculated Data and Graph Display

- Displacement (origin base, first frame base), velocity, acceleration, cumulative distance traveled, relative displacement (distance between two points), relative velocity, relative acceleration
- Displacement of center of gravity, velocity, acceleration, momentum, force, power, kinetic energy
- Angle (relative/absolute), angular velocity, angular acceleration, plane designation (XY, YZ, XZ)Angle, angular velocity, angular acceleration by Euler angle
- Distance between point and plane (relative displacement), relative velocity, relative acceleration
- Line and plane angles, angular velocity, angular acceleration
- 2D/3D joint torque, AD conversion data
- Specify components of each graph (X, Y, Z, composite), XY graph (scatter plot), FFT, histogram, original formula, standard deviation.

Statistical Processing

Average, standard deviation, maximum/minimum value and its time, slope value, integration point.

Software

Digitizing Program	– IFS-25H type
2D Analysis Program	- IFS-20H type
3D Analysis Program	- IFS-23H type
Slide Shot	- IFS-52B type

File I/O

Video File: AVI, MOV, MP4

Import

Binary Format: C3D,TRS,ASD,ASD2

Text Format: ASC,2D,3D,CAL,CSV,TXT,MDL,BSP

Export

Binary Format:C3D,AVI,ASD2

Text Format: ASC,2D,3D,DIFF,BVH,CAL,CSV,TXT,MDL

File Conversion

- Convert the 3D coordinates of the whole body, 23 points or 25 points to BHV format, and move the 3D figure with POSER.
- C3D format, Can be converted to DIFF format of Clinical Gait Analysis Study Group.

Copy to Clipboard

Stick Picture	BMP Form
Co-Ordinate Values	Digitized data, 2D co-ordinates, 3D co-ordinates, calibration co-ordinates
Analysis Value	Copy calculated analysis value in text format, copy graph in BMP format

System Requirements

Compatible OS	Windows 10 (64bit) or later (Windows 11 compatible)
Graphic	[Display resolution] 1024x768 or higher [VRAM] Recommended to install dedicated graphics memory.
CPU	Intel i5 1.6Hz or higher recommended
RAM	8GB or more Recommended

HDD Free space

10 GB or more (when using the video cache function)

*When using the AI automatic digitizing function, a dedicated PC is required.

(Purchase the specified items from us, set them up, and give them to you.)

* The configuration items, models, and specifications of this system are subject to change without notice for improvement.

PARSED VALUE: Copy calculated analysis values in text format, copy graphs in BMP format

CO-ORDINATE VALUE: Digitizing data, 2D co-ordinates, 3D co-ordinates, calibration co-ordinates

Item		Digitizing Program [IFS-25H]	Digitizing Program[IFS-25H] + 2D Analysis Program[IFS-20H]	Digitizing Program[IFS-25H] + 3D Analysis Program[IFS-23H]
Digitize Function		✓	✓	✓
Co-ordinate Interpolation		✓	✓	✓
Filter		(Stick only)	(Stick + Graph)	(Stick + Graph)
Stick Picture Design		✓	✓	✓
File I/O		✓	✓	✓
Copy to Clipboard		✓	✓	✓
AVI Saving of Stick Pictures		✓	✓	✓
Standardization/Averaging		(Standardization only)	✓	✓
Event			✓	✓
2D/3D Analysis Settings items		—	✓	✓
Calculated Data & Graph Display	Displacement System	—	(X/Y/Composition)	(X/Y/Z/Composition)
	Relative Position Graph	—	(X/Y/Composition)	(X/Y/Z/Composition)
	Point and Plane Graph	—	—	(Positive/Negative/Absolute Value)
	Angular Graph	—	(XY)	(XY/YZ/XZ/3D)
	Euler Angles Graph	—	—	(1st rotation angle/ 2nd rotation angle/ 3rd rotation angle)
	Line and Flat Graph	—	—	(acute angle/obtuse angle)
	Particle System Graph	—	(X/Y/Composition)	(X/Y/Z/Composition)
	Joint Torque	—	(2D Torque)	(3D Torque)
	AD Conversion Graph	—	✓	✓
	FFT Histogram, etc.	—	✓	✓
Statistical Processing		—	✓	✓
Slide Shot Option		(Slide Shot only)	(Slide Shot, Event Shot)	(Slide Shot, Event Shot)

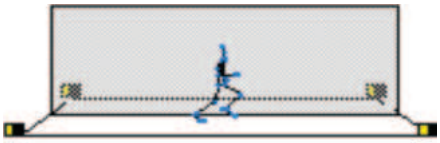
Various Scenes

Extensive Calibration Methods

Frame-DIAS 6 adds the 3D CC method to the existing calibration methods. A total of seven methods are available for all types of analysis.

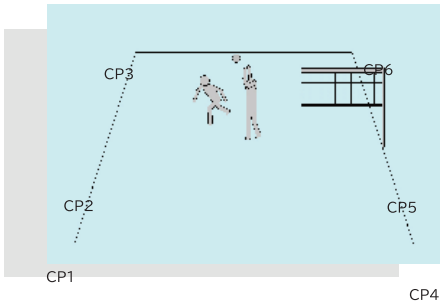
2D 4-POINT REAL LENGTH CONVERSION

This is a method that allows you to easily construct two-dimensional coordinates with a single camera. There are restrictions on camera placement, so images are taken almost directly to the side of the operating surface (with the camera's optical axis perpendicular).



2D DLT METHOD

This is a method that places less restrictions on camera placement during shooting. Even if the optical axis of the camera cannot be set perpendicular to the movement plane, coordinates can be constructed with high accuracy. It is used for measurement on slopes and movement trajectory measurement on the ground. Four or more control points (calibration points) are required on the analysis plane.



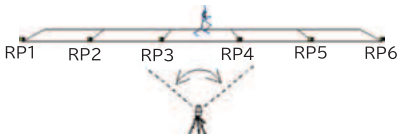
3D DLT METHOD

Measures complex 3D movements that cannot be captured with 2D measurements. Shoot with two or more fixed cameras. There are few restrictions on camera placement, and the position can be selected according to the shooting environment and target movement. Six or more control points are required within the shooting space

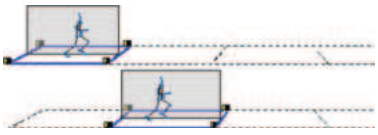
PANNING METHOD

By swinging the camera left and right according to the movement of the subject, it is possible to measure a wide range that cannot be captured by a fixed camera.

1. 3D DLT Panning & 2D DLT Panning



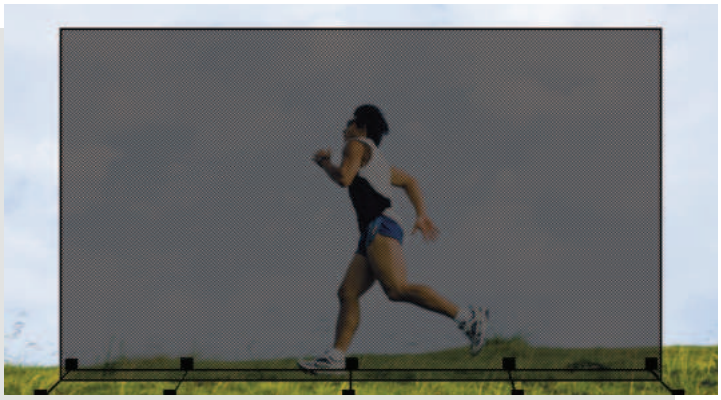
2. 2D 4-Point Real-Length Conversion Panning



3D CC METHOD

Three-dimensional calibration can be performed based on a minimum of three calibration points.

Calibration points can be placed on a plane, so you can use the stadium or court lines. There is no need to enter the measurement space for calibration work when shooting at the stadium.

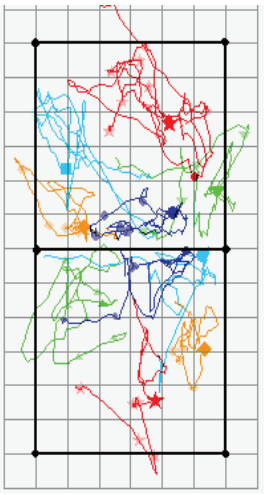


2D MOVEMENT

Two-dimensional analysis can be done with a single camera if the motion is mostly in the plane. Calibration work is easier if it is possible to take pictures from directly beside the operating surface. It can be applied to analysis of walking, running, jumping, climbing stairs, etc.

MOVEMENT TRAJECTORY, TACTICAL ANALYSIS

It can be used to measure the two-dimensional position of athletes on the field or court of sports competitions. Take a bird's-eye view and film from the highest possible position on the competition field



EVEN IN THE MATCH

Equipped with multiple calibration functions depending on the scene and the ability to use a variety of cameras, it can flexibly respond to a variety of shooting environments.

OUTDOOR SHOOTING, SPORTS ACTION

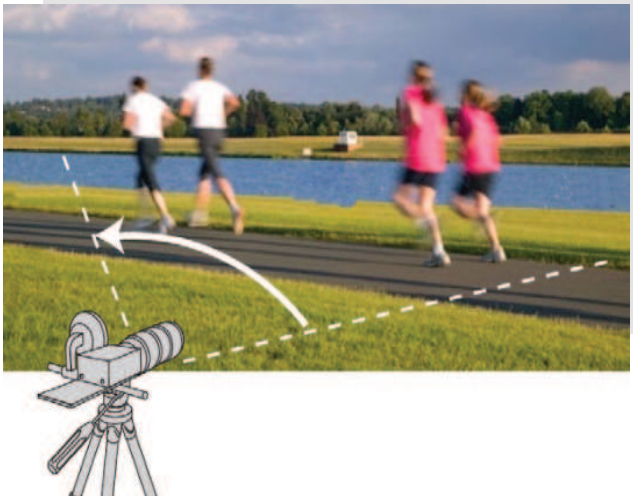
It is also possible to collect data outdoors, which is difficult with fully automatic digitizing. A high-speed camera is used for fast motions, enabling markerless analysis of practical motions at sports sites. Even complex movements involving rotation can be handled by manual digitizing

3D MOVEMENT

It is possible to analyze 3D movements that cannot be understood in 2D. Although it requires two or more cameras, it has the advantage of having fewer restrictions on placement. It can be applied to analyze various behaviors.

WIDE OPERATING RANGE

If the range of motion is too wide to fit within the angle of view of a fixed camera, the camera can be rotated (panned, tilted) to shoot. It can be applied to analysis of running, skiing, etc. over the number of steps.



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