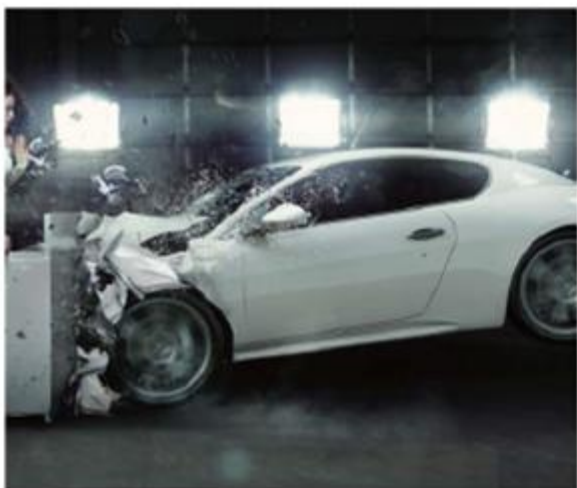


Full Spec Motion Analysis



DIPP-Motion V [Five]



Do you want to be on the cutting edge of image analysis technology?

Get our latest software for 2D and 3D motion analysis.

A full spec off-line motion analysis software for all needs, based on normalized cross correlation, grayscale binarization, HLS color and checker marker tracking.

Analysis flow

Image input

- Main supported video formats are AVI and WMV. Any video format can be used through a video converter tool. Accurate and robust measurement by various pre processing function.

Tracking

- Marker point placement, tracking and modification.
- A variety of tracking techniques are available. DIPP-Motion V has powerful correlation tracking functions, enabling it to capture even the most difficult patterns.

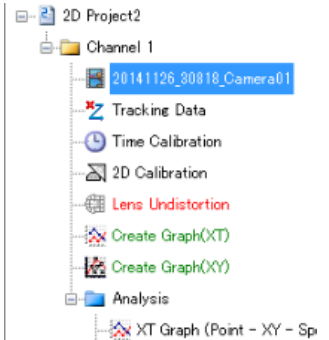
Calibration

- Transformation of pixel data into real coordinates.
- Easy 2 points/ transformation/ grid functions for 2D.
- Our optional scale tool for 3D enables you to make accurate 3D measurements.

Analysis

- Graphical view and easy analysis.
- Results can be exported as CSV or WMV files.

Simple operation flow with tree structure and project files.



Tracking Features

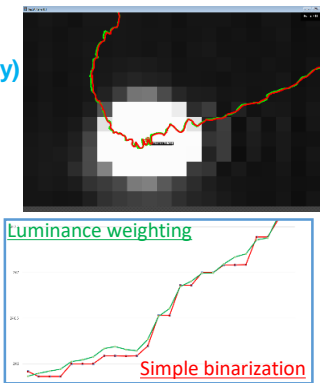
[Tracking tech] Binarization

Binarization using grayscale/HLS color information.

Weighting (luminance gradient for grayscale only)

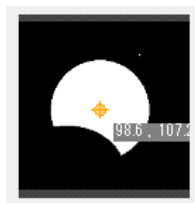
Add luminance information for calculating the center of gravity.

More than 0.1 pixel is able to be resolved by using edge information smaller than a pixel.



Circle fitting

Digitize center of the circle curve fitted from binarized "circle" target. This algorithm will try to avoid the center of gravity going off the circle center, because of shadows or obstacles.

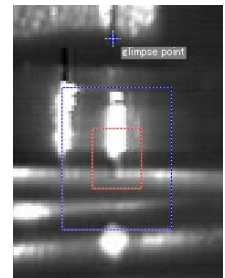
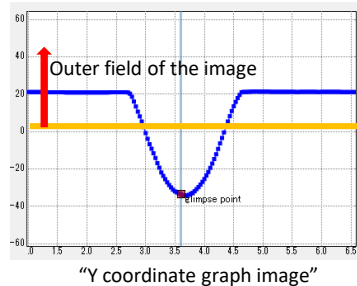


[Tracking tech] Normalized cross correlation

Otherwise known as "pattern matching", our software will track any characteristic pixel grayscale array, even without adding special markings first.

Off-set designation

Able to select arbitrary positional relation from the template center.



Template update (sequential)

This function will update the template sequentially between 2 time line tracked image. Available for targets which keep changing slightly.

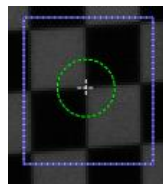
[Tracking tech] Automatic marker extraction

You may also use extraction function for Binarization grayscale, Grid point correlation, and Checker patterns.



[Tracking tech] Checker marker

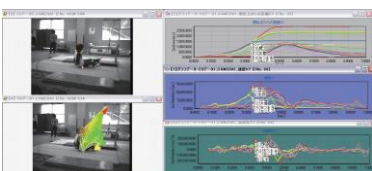
Brightness gradient and symmetry-based detection will make your analytical work easier and efficient.



[Analysis]

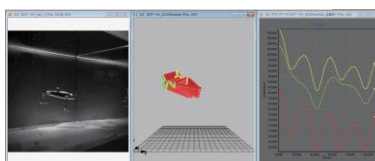
Graph XT and XY

Items such as distance, velocity, acceleration, angle with free layout and various functions for XT(- time line) graph and XY(- scatter) graph.



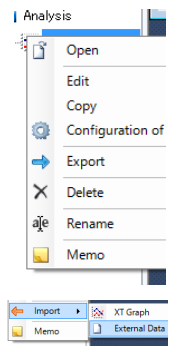
Replay and Screen Capture

All displayed items can be replayed synchronously. Items in replay view can be screen captured for easy use in presentations.



Output / Input

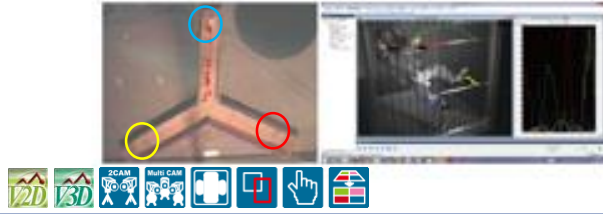
All coordinate and graph data can be exported in CSV format. You may also import external CSV data (such as logger data or simulated data) to compare with measurement data.



Case Examples

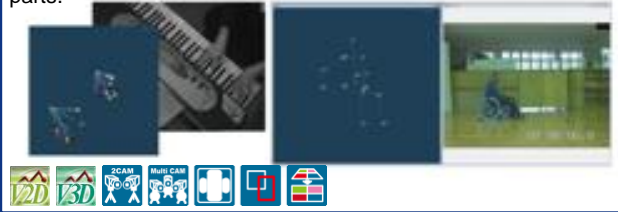
Experimental animal behavior analysis

You may be able to analyze each animal's position by using target marker or animal's body itself. Area analysis with selecting ROI is useful for getting statistical works.



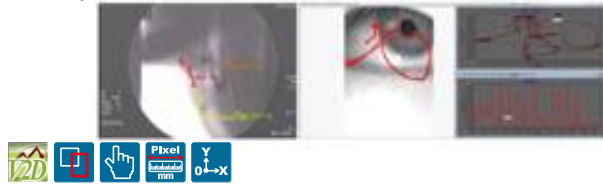
Gait Analysis / Human Motion Capture

Human behavior, motion, gait performance analysis in ergonomics / physiotherapy research. You can use one or more cameras to analyze full body motion, or the movement of individual body parts.



Swallow / Mastication / Eye movement

Normalized cross correlation tracking is useful to track the pattern inside VF images. The application will give you a great advantage Over manual video digitizing. The coordinate transformation function can cancel out head motion and give you the relative position for the "real" adjusted motion.



Sports Science

Application for kinematics analysis/gear motion. Our technology for ball spin and ball speed are also used in our golf impact monitor system. Underwater Request for under water behavior can be done by using waterproof case for the camera or clear window for imaging.



Crash test and dummy dolls

Dummy movement analysis in crash tests.



Automotive parts manufacturing

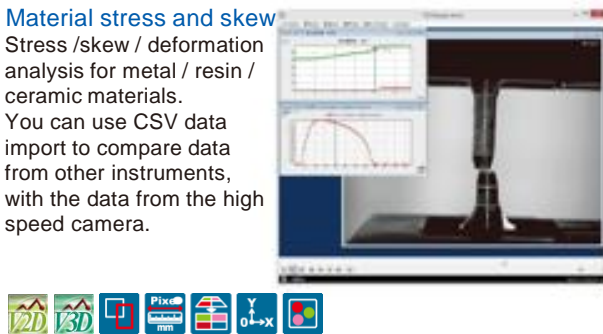
Easy to get XY or XYZ coordination of wind shield wiper/engine/spring/windows.



Material stress and skew

Stress /skew / deformation analysis for metal / resin / ceramic materials.

You can use CSV data import to compare data from other instruments, with the data from the high speed camera.



Robot arm / Manipulator

Program certification and repeat behavior consistency analysis. You can use stereo high speed cameras to make comparisons between the actual movements, and the simulated or planned movements.



River/Sea, Construction and Aerospace

Non-contact measurement using camera system is useful for hydraulic motion analysis. Able to give a wireless and unbounded way of measurement. You can use a 3-point model to make a 6 DOF (XYZ and RPY) analysis of floating objects.



Shake table experiment

2D/3D vibration analysis for construction and materials. Used in earthquake research / civil engineering / energy industry. No limit for the camera CH volume.



●ICON list

[[DIPP-Motion V/2D]] [[DIPP-Motion V/3D]]

Checker mark

Manual digitize

2point cal

Projection

Coordinate transformation

6DOF

HLS color

Binartization

Correlation

2cam

Multi-cam

Pixel

mm

Y

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Camera selection and system image

DIPP-MotionV can use all kinds of camera interface from entry-level consumer video camcorders to professional industry camera for image analysis.

Measurement results will be heavily affected by this choice.

Accuracy

Coordination accuracy will depend on the camera resolution (pixel size).

High resolution camera such as FULL HD(1920x1080), 5M(2592x2048) will bring highly accurate measurement.

Time resolution

Time resolution will depend on the camera frame rate (frame par sec : fps) = frame volume number in one second.

Video rate such as 30 or 60 fps are close to the natural rate of the human eye. Using our high-speed cameras allows you to capture many aspects, which is normally invisible to the human eye.

DIPP-Motion V/2D

2D measurement

- *Easy measurement with any video.
- *Use video converter for Mpeg2, MOV, MP4 files.
- *Easy 2 points calibration.



DIPP-Motion V/3D

Stereo imaging system

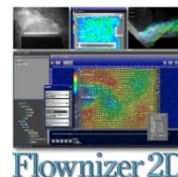
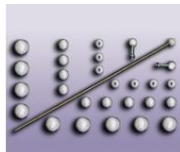
3D measurement

- *All channels need to be synchronized.
- *More than 2 cameras required.
- *Unlimited number of channels.
- *DLT cube / Dynamic wand for calibration.



Analysis options

- Ex USB license key
- Calibration cube
- Reflective marker
- High speed camera
- PIV software series



Specifications

※Specifications and external appearance may be subject to change without notice.

PC Requirements	Windows7,8,10 / Corei5 (multi-core) / HDD free space 10GB / 4GB memory / OpenGL2.0
Tracking mode	Normalized cross correlation / Binarization grayscale / Binarization HLS / Checker marker (for automatic or modified), Digitize (for manual)
Automatic marker extraction	Binarization grayscale / Checker marker / Grid point for correlation / Particle tracer
Max tracking point	Unlimited (as for software)
Max tracking frame	Unlimited (as for software)
Accuracy	Sub pixel (for 2D) / Prox. 0.1% (for 3D) *depends on your setting
Supported formats (Image)	PNG / TIFF / GIF / Jpeg / BMP(sequential), AVI / WMV(video) *only 8bit monochrome/24bit color
Supported formats (value)	CSV / Project binary (.dm5)
2D calibration	General 2 point /Projection / Grid
3D calibration	8 point DLT / 3 point Dynamic wand
Lens distortion correction	Multi-plane correction with Z.Zhang model
Pre processing	Transformation / Arithmetic / Frame arithmetic / Color / Smoothing / Noise remove / Filter / Channel / Field divide / Frame shift / Pixel shift
Measurement data	X, Y (2D) X, Y, Z (3D)
Post processing	Remove / Interpolation / Smoothing / virtual point
Graph analysis items	Point / Distance / Average / Distance between marker / Rotation angle / 3 point angle / 2 line angle / Roll & Pitch & Yaw (3Dmodel)



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