

CAMERA MOTIONS

Synonyms: Image device movements.

Definition: Set of camera movements generated by users in both fixed and mobile situations.

Estimating camera motion parameters from a video sequence constitutes one of central themes in computer vision and multimedia. These parameters are widely used to efficiently store and manage large volumes of video data, as references to particular video segments, and also as means of tracking objects in digital video. Figure 1 depicts typical types of camera motions. Translations of the camera along the horizontal and vertical axes of the imaging plane are called track and boom, respectively. Translation in the direction of the optical camera axis is called dolly. Pan refers to the turning around the vertical axis, whereas tilt refers to the turning around the horizontal axis. The camera rotation around the optical axis is called roll. In addition to the above motion types, many cameras can also change the focal length or zoom.

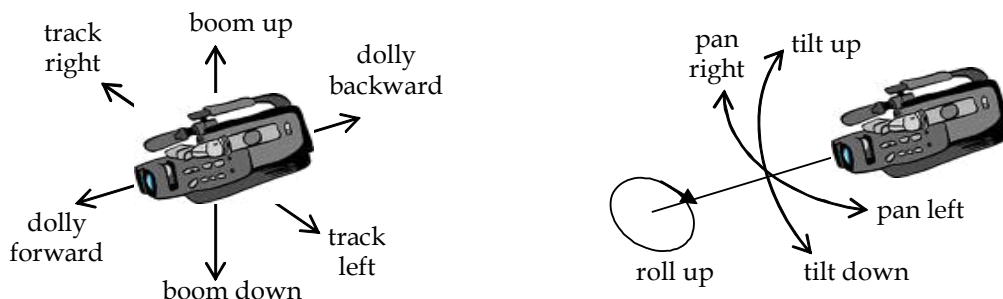


Figure 1. Examples of typical camera motions.

Camera motion parameters estimation constitutes an extensively researched area due to its use in applications such as video compression, augmented reality, and video stabilization. Existing methods can estimate camera motions by operating in the compressed domain [1], [2] which makes them attractive for today's video and visual communication systems. Qualitative estimation of camera motion parameters can be also derived from the composition of optical flow models [3]. Figure 2 depicts schematically the optical flows generated by some basic camera motions.

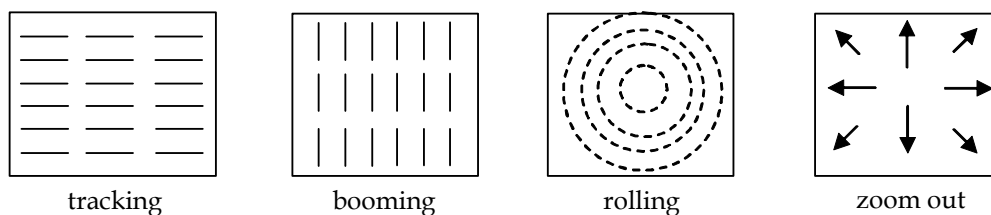


Figure 2. Optical flows generated by the basic camera motions.

See: Video stabilization, video codec, exposure values

References

1. R. Ewerth, M. Schwalb, P. Tessmann, B. Freisleben, "Estimation of Arbitrary Camera Motion in MPEG Videos", in Proceedings of International Conference on Pattern Recognition, vol. 1, pp. 512-515, 2004.

2. Y.P Tan, D.D. Saur, S.R. Kulkarni, P.J. Ramadge, "Rapid Estimation of Camera Motion from Compressed Video with Application to Video Annotation", IEEE Transactions On Circuits and Systems for Video Technology, vol. 10, no. 1, pp. 133-146, February 2000.
3. Y. Wang, J. Ostermann, Y.Q. Zhang, "Video Processing and Communications", Prentice Hall, 2002.