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AN OBJECT–ORIENTED IMAGE ANALYSIS–SYNTHESIS CODER BASED ON MOVING 3D–OBJECTS

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For object–oriented analysis–synthesis coding an image analysis algorithm is required which automatically generates the parameter sets which describe moving objects in an image sequence. In this contribution it is assumed that 3–dimensional rigid objects are arbitrarily moving in 3–dimensional space. Thus, the 3–dimensional real world is modelled by a 3–dimensional model world [1] . Goal of the modelling is to generate a model world which has a model image identical to the real image.

Task of the image analysis algorithm [2] is to find moving objects in the scene and describe each object by means of shape, motion and color parameters. By means of these parameter sets enable to synthesize realistic looking images. These parameter sets have to be coded by parameter coding. Comparing the source models 3D–object and 2D–object the amount of bits used for for coding motion will not differ significantly but an enormous increase in shape information is possible depending on the representation of 3D–shape. In this contribution the 3D–shape of an object is determined by the object silhouette. Hence, the amount of shape information to be coded is comparable to those in the case of 2D–objects.

The parameter sets of an object–oriented analysis–synthesis coder [1] are coded by parameter coding. Parameter coding is controlled by coder mode control. Coder mode control allows to concentrate color update information on small image areas and suppress color update informations in areas where the synthesized image still looks plausible. Hence, geometrical distortions instead of quantization errors are introduced. This reduces image areas to be updated mainly near boundaries of the current object silhouette where image degradation due to object rotation will not be visible as easy as in the case of a 2D–model.

Knowing the model world at both sides of the communication link, only changes of object shape and object color, object motion, and new objects entering the scene have to be coded.

For the source model of moving 3D–objects first results obtained with parameter coding allowing geometrical distortions will be shown.

References:

[1] F. Kappei, C.–E. Liedtke, "Modelling of a natural 3–D scene consisting of moving objects from a sequence of monocular TV images", SPIE, vol. 860, Cannes

1987.
[2] H.G. Musmann, M. Hötter, J. Ostermann, "Object–oriented analysis–synthesis coding of moving images",SIGNAL PROCESSING, image communication, no. 2,
nov. 1989.