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CHROMATIC INFORMATION ADAPTATION FOR COMPLEXITY-BASED INTEGRATION OF MULTI-VIEWPOINT IMAGERY – A NEW APPROACH TO COOPERATIVE PERCEPTION IN NATURALLY COMPLEX SCENERY –

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Abstract. *Due to subconscious information processing performed by the human neurophysiological system, decision making in critical situations is far more difficult than verbal description of the decision process. Noticing this empirical fact, a new framework is presented for cooperative perception in naturally complex scenery. In this framework, bird's eye imagery broadcasted from a satellite and/or avionics sensors is exploited as an as-is description of local terrain. As the basis of dynamic coordination of human and machine perception processes, then, the bird's eye image is integrated with scene imagery captured by an onboard camera. To indicate the situation to be encountered, objects are anticipatively identified in this multi-viewpoint map from which essential capabilities for autonomous maneuvering may arise. For this purpose, in this paper, scene image and bird's eye image are associated through dynamic reference to the Global Positioning System (GPS). In this as-is digital map, imaging processes of natural objects are assumed to be governed by the following universal rules: self-similarity and trichromatic decomposition. By coding an object image in terms of fractal attractor, the expansion of object surfaces are sampled efficiently to generate a scene specific palette. The palette is adapted to another set of color samples extracted from the bird's eye image to match the object viewed from the frontal and bird's eye views simultaneously. To simulate the sensitivity of human perception to the 'white' daylight even under considerable spectrum shift, the randomness filling object images is indexed as crucial invariant information binding multi-viewpoint imagery. As the result of randomness-based matching, chromatic complexity of object images is adapted and matched* prior to *the recognition of the object. The feasibility of the framework is investigated through experimental studies.*
Keywords: Chromatic complexity, Complexity-based integration, Multi-viewpoint imagery, Naturally complex scenery

1. **Introductory Remarks.** Since pioneering investigation [7] up to today's statistics on traffic accidents in Japan and Germany, it is commonly conjectured that decision support one second prior to a critical situation reduces the number of fatalities to 1/10 of the current level [32]. Psychophysiological measurements on 'neural' dynamics imply that the final one second results from the processing time of linguistic complexity of imagery [8]. Following empirical knowledge on human perception and decision, the scope of possible recognition in natural situations is confined to within a small symbol space [13]. Though there is a lack of a universal framework for understanding a seeing-maneuvering scheme, two decades of investigation in robot vision have revealed the mental complexity of the perception-decision process. For instance, object symbols are grounded on image features as context-free visualizations of the scene via nondeterministic reasoning processes [22].