Docket #: S12-023

Coding of Geometry Information for a set of features in an image

Highly efficient data transmission is critical to the responsiveness of mobile visual search and mobile augmented reality applications. The recognition step, in which location, scale, and orientation information of the image features is extracted from the viewfinder frame and then transmitted from the client mobile phone to powerful computing resources where visual search and recognition are performed, is particularly data intensive. Any improvements to the compression of information can significantly reduce the time and power required for the recognition step and correspondingly enhance the response of the interactive augmented reality experience.

In this invention, two new methods are shown to significantly improve compression of location information of query features in an image. In multi-size block encoding, a binary map is used to describe the histogram map in larger strides. Square blocks of histogram bins are grouped together and a value is assigned to represent if it is occupied. Histogram bins are then coded only for the groups that are occupied. This method gives a scalability over a wide range of feature counts.

The occupancy-based context model provides a finer level of detail. The histogram map is coded in a raster scan order and includes occupancy information based on its neighboring histogram bins using only the number of features that fall in the neighboring bin at a given distance. This new occupancy-based method has a much smaller context space which can both reduce the encoder size and make the data requirements for the training samples far less stringent.

Applications

- Applications in which features in a image is transmitted over a channel. For example, in a mobile visual search system, the query information may need to

be sent over the network to a server for processing. The invention would reduce the amount of information transmitted.
- Applications in which a set of features is stored inside a database. For example, when one performs image matching, features are stored inside the hard drive and loaded into memory for comparison. The invention would reduce the amount of data that is stored on the hard drive or memory.

Advantages

- The multi-size block coding method provides a lower bitrate for a wider range of input feature sets compared to previous methods.
- Occupancy-based context models need only a fraction of the context size of previous methods and also improve the encoder efficiency and reduce the number of training images required.

Patents

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