ABSTRACT

Many image processing problems are primarily image labeling problems. Graph theoretic modeling involving combinatorial optimization has been used in image labeling problems for more than two decades (**[47], [48], [83], [84]** and **[86]**). In-depth mathematical study of such graph theoretic models for uniformly smooth structure (using interchange moves), segment wise smooth structure (using growth moves) and universally constant structure (using shift moves) is carried out in the thesis. A graph-cut model for image binarization problem (applied to optical character recognition) is devised, coded through java programming language and experimentally tested on various textual images. Graph cuts basically assign two values to objects under consideration efficiently (through energy minimization concept) in single iteration. There are varieties of problems, not limited to computer vision, which are or can be addressed by optimization. Detailed study to answer the question: *which types of such problems could be addressed by graph cuts* - is studied in the thesis. Characterizations of two classes (O^2 and O^3) of objective functions minimizable by network flow terminology are developed and studied.