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USING AN OBJECT ORIENTED CALCULATION PROCESS FRAMEWORK AND NEURAL NETWORKS FOR CLASSIFICATION OF IMAGE SHAPES

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Abstract. *Modern software systems are perpetually becoming more complex. Machine vision is a field that demonstrates this concept clearly. Shape classification, which is a part of machine vision, has both high and low level image processes in it. This paper presents a framework that brings the definition and implementation of complex calculation processes into the object oriented paradigm. Defining processes in this manner assists in concurrent development by groups of people. The paper describes how the shape classification process is implemented in the framework. Results of a C# implementation are compared to a procedural implementation in Matlab. The timing requirements for the various stages of the shape classification process are evaluated. The object oriented framework is well suited to high level machine vision concepts while the procedural paradigm is well suited to low level tasks such as edge detection. The C# implementation of the shape classifier demonstrates the maintainability and reusability of the framework. It has 26 out of 33 process classes using inheritance for specialization or composition for defining sub-processes. This framework is well suited to machine vision processes.*
Keywords: Object oriented, Calculation process framework

1. **Introduction.** The complexity of modern software projects is perpetually increasing because of the growth in computational power available. Modern software engineering techniques allow us to comprehend these large software systems and to manage the complex requirements of a user's application [1]. There is a tendency for users to demand more intelligence from their software and this typically requires the complexity of the calculation process to be increased. Up to now, software engineering techniques have been assisting us in designing, reusing and maintaining the large software systems. What is lacking is the focus on developing methods for writing complex calculation processes which are necessary for increasing the overall intelligence of the system. An example where this is the case is in the field of machine vision. There are many different features of an image which can be used for classifying objects and these include color, texture, motion, context and shape [2-4]. Shape information is used extensively for classification of objects in vision systems and is an important visual feature [5,6]. There are also several methods that can be used for performing the classification of the object and these include similarity distance measures, template matching, index calculation, hashing, maximum likelihood, clustering and neural network classification [4,7]. There are many advantages