Preface

This special issue is devoted to optimal labeling theory, which forms one of the most promising and growing trend in modern pattern recognition. The theory deserves an intent attention of pattern recognition and artificial intelligence community and requires the most careful study on the highest scientific level. There are several reasons to predict that the research of optimal labeling problems will form one of the main streams in pattern recognition of the nearest decade.

Main concepts of the optimal labeling theory allow a unified formulation of pattern recognition problems independently on the great variety of their applied content. So they allow an analysis of the recognition problems in a general abstract form with no regards for peculiarities of such or another application and so to analyze just those aspects of pattern recognition that have to be analyzed theoretically.

Formal frame of the labeling theory is appropriate not only for various pattern recognition problems but for some other problems of artificial intelligence such as natural language analysis, intelligent data bases and others. So, pattern recognition becomes a component of a single mechanism of various thought processes, which have been studied before separately from each other.

Theoretical study of optimal labeling as well as its application calls for integration of mathematical tools from different areas of modern computer science such as constraint satisfaction problem, Markov and Gibbs field theory, supermodular discrete optimization, formal language theory and its fuzzy and stochastic generalization. So, pattern recognition requires now a much wider range of mathematical tools as compared with classical pattern recognition in multidimensional feature space based mainly on multivariate statistics and probability theory.

It is important that the mentioned mathematical tools, which have been developed independently outside pattern recognition, come in unusual contact with each other when they are used inside pattern recognition. They assume a slightly other meaning and a persistent request arises for completely new solutions to known problems. It leads to new methods and new results, which belong already to pattern recognition theory and form its mathematical base.

This special issue results from an informal meeting in International Research and Training Center of Information Technologies and Systems (IRTC) in Kiev, Ukraine, at the September 2010. The seminar was devoted to labeling problems in pattern recognition and consisted of invited lectures. The following invited lecturers took part at the seminar:

B. Flach (Czech Technical University, Prague),
V. Franc (Czech Technical University, Prague),
S. de Givry (INRA, Toulose),
V. Hlavac (Czech Technical University, Prague),
V. Kolmogorov (University College, London),
I. Kovtun (Viewdle, Inc., Kiev),
Yu. Musatenko (Viewdle, Inc., Kiev),
S. Nowozin (Microsoft Research, Cambridge),
B. Savchinskiy (Heidelberg University),
T. Schiex (INRA, Toulose),
D. Schlesinger (Technical University, Dresden),
C. Schnoerr (Heidelberg University),
A. Shekhovtsov (Czech Technical University, Prague),
M. Tyshchenko (IRTC, Kiev),
T. Werner (Czech Technical University, Prague),
S. Zivny (Oxford University).

So, the principal European research centers on pattern recognition were presented and widely known researchers, noted for their weighty impact to pattern recognition, took part at the seminar.

One of the lectures was delivered by M.I. Schlesinger (IRTC, Kiev).

The welcome speech was delivered by Prof. V.I. Gritsenko, director of IRTC.

No publications of the seminar proceedings were foreseen. Nevertheless, the participants of the seminar respond my call to acquaint Ukrainian pattern recognition and artificial intelligence community with a state-of-the-art in labeling problem as a promising area of pattern recognition. So, this issue consists of papers written by the seminar participants, not lectures delivered at the seminar. Content of the lectures is shown in their presentations at http://irtc.org.ua/image/pages/konchazaspa.

I am grateful to participants of the seminar and to authors of this issue and wish them new successes.

I am grateful to Mr. Laurent Gil, CEO of Viewdle, Inc. , who with no hesitation grasped my idea about the seminar and then supported essentially all my intentions.

I am grateful to readers of this issue for their attention to the problem and wish them pleasant, easy and fruitful reading.

M.I. Schlesinger, 5-th March 2011, Kiev.