

Advances in Intelligent Systems and Computing

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Fabio Leuzzi · Stefano Ferilli
Editors

Traffic Mining Applied to Police Activities

Proceedings of the 1st Italian Conference
for the Traffic Police (TRAP-2017)

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Foreword

Applied research. These are perfect keywords to describe our times, efforts, needs, and prospects of human development. For the first time, with TRAP-2017, the Italian Traffic Police—I would say the Italian National Police in general—has organized a scientific conference in which the competences, specialties, and topics of a police force constitute the observation ground of applied research.

Such an initiative might sound unusual for a Public Administration, whereas one might think that the organizers are about a decade late. Whatever the reader thinks about this, the main message we want to convey concerns our new look.

The Italian National Police continuously strives to fully understand the various phenomena, to fight crime and ensure safety and security. Nowadays, however, prevention and repression are not enough to appropriately tackle the new challenges. The great amount of data around us cannot be ignored to successfully and timely meet our objectives. Therefore, our aim is to start a new age in our history, an age centered on technical and sophisticated approaches to extract information from the vast amount of data which otherwise could not be used, an age focusing on the improvement of our abilities to predict significant events. All tasks that can be no longer performed through paper and pencil only.

The safeguard of the freedom of movement, which represents the glorious past and the proud present of the Italian Traffic Police, will still and always be the core of its identity. This identity is essential to be at the forefront in facing the new challenges posed by the so-called smart cities, smart roads, by the circulation of intelligent cars, by Intelligent Transport Systems and other innovations that represent our present and future.

Let us make some brief considerations on the main difference between high school and university. The former aims at providing students with valuable bases upon which specialized studies can be carried out, basing teaching on books containing consolidated notions. University, on the other hand, is the place where the state-of-the-art and latest innovations are developed and, thanks to the research activities of professors and researchers, transferred to students.

The same can be said for the Italian National Police. This volume officially marks the moment in which the Italian Traffic Police improves its approach to knowledge and officially enters the world of research, dealing directly with the relevant academic experts in order to apply state of the art of applied research and perform its institutional activities through up-to-date knowledge, exploiting the most advanced techniques and innovative tools that research in science and engineering can provide.

I am pleased to witness and strongly support these new and strategic directions, and I am sure that these efforts will soon result in tangible outcomes.

October 2017

Franco Gabrielli

Preface

The First Italian Conference on Traffic Mining applied to Police Activities (TRAP-2017) was held in Rome during October 25–26, 2017, in the context of the celebrations for the 70th Anniversary of the Italian Traffic Police (*Polizia Stradale Italiana*). Its aim was to gather data mining researchers, traffic researchers, and decision makers and provide them a common forum for discussing the development and exploitation of automatic traffic analysis systems that can detect, track and, more in general, understand the behavior of road users in order to identify criminal behaviors.

Indeed, with the increasing amount of traffic information collected through automatic number plate reading systems (NPRS), which are widely spread on Italian highways, it is highly desirable for police activities and investigations to be able to extract meaningful traffic patterns from the accumulated massive historical dataset, in order to identify potential criminal behaviors. However, analyzing traffic data for this purpose is challenging due to the huge size of the dataset and the complexity and dynamics of traffic phenomena.

Topics of interest included detection and tracking of road users and vehicles, behavior understanding of road users, automatic understanding of the environment in traffic scenarios, applications related to traffic surveillance, and vehicle accident analysis. Examples of techniques of interest are outliers detection and understanding, clustering and conceptual clustering, process mining, inductive logic programming, deep learning and classification.

To allow interested researchers to work on real-world data that are hardly available to the wide public, the organizers provided a dataset reporting transit data recorded using several gates spread along a limited area of Italy, in which gates are homogeneously distributed. As an option, authors had the possibility to propose contributions specifically focused on this dataset.

With the aim of unifying the way experimental results are evaluated and to push research forward on the development of real working systems supporting police activity, a shared task was proposed, whose main practical goal was to identify itineraries that might indicate a criminal intent. The scientists were free to define the concept of itinerary, formalizing it functionally to their proposed approach. They

were free to integrate open data into the itinerary features or not. Criminal intents could be described, for instance, as follows:

- The sequential visit of service areas facing each other;
- The sequential visit of service areas in the same direction;
- Transits that are inconsistent under the space-time point of view, that might be due to cloned plates;
- Combinations of the previous cases involving several plates and possibly the same criminal organization;

and so on.

Two invited talks and nine original research papers related to the conference main topics, or to other relevant topics of interest to traffic understanding, were presented during the conference, allowing researchers and practitioners to pose problems and propose solutions, to identify common tasks of interest and to plan possible cooperation.

We would like to thank the Italian National Police for its invaluable support to the organization of this conference. Our special thanks go to the Director of the Central Directorate for the Specialties of the Italian National Police, Roberto Sgalla, and to the Director of the Italian Traffic Police, Giuseppe Bisogno. They quickly understood the importance of applied research for police activities and strongly believed that the TRAP-2017 initiative could be appreciated by researchers around the world. Grateful thanks are also due to all the sponsors for making this event possible, and to all the people who contributed to the organization and success of the conference. Let's hope this was just the beginning.

TRAP-2017

Rome, Italy
Bari, Italy
October 2017

Fabio Leuzzi
Stefano Ferilli

Organization

TRAP-2017 is organized by the Italian National Police, Traffic Police Department, Ministry of Interior.

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