

Identify Criminals' Modus Operandi Using Police Reports

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Abstract

Detecting criminals' behavior patterns, i.e., criminals' modus operandi (M.O.), is one of the main concerns in the field of computational criminology. It can be very useful in order to increase the probability of catching criminals and to solve open crimes. Moreover, it can be beneficial for detecting a set of crimes committed by the same offender, i.e., performing a crime linkage [1]. Crime linkage is a complex and time-consuming problem that requires a massive effort and many police resources.

The traditional crime linkage is based on manual report analysis and information extraction [2]. In order to perform crime linkage, the police investigator needs to extract criminals' M.O. and to compare it with historical crimes [3]. The police investigators goal is to find similarities between historical crimes and on-going crime. This manual process may result in errors and missed crimes [4]. In this study, we suggest a generic, automatic, and efficient method to extract criminals' M.O. Example of our method results is presented in Fig. 1. In this example the input is a police report and the output for each M.O. dimension is a probability. Using this mechanism, we are able to discover complex relationships between burglaries that can be overlooked by a human eye. We manage to detect possible suspects for committed crimes, without any manual processing.

We use more than 90,000 narrative police reports of burglary cases in Israel. The reports are written in spoken Hebrew, therefore the M.O. extraction is a challenging task. Using our method, we are able to circumvent the difficulty of processing the Hebrew language utilizing words' embedding.

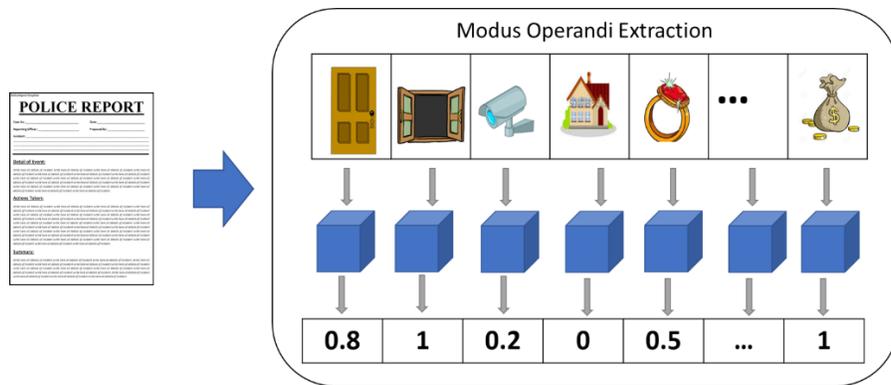


Fig. 1. Example of Modus Operandi extraction

The extracted M.O. is given as input to Siamese neural network. Siamese neural network [5] proved to be efficient with various tasks of objects identification, such as face recognition [6, 7], object tracking [8, 9] and information retrieval [10]. Inspired by the success of those studies, we suggest utilizing a Siamese neural network in order to perform crime linkage. The input for the Siamese neural network is the suspects' M.O, and burglaries' time and location. The Siamese neural network architecture is described in Fig. 2. To the best of our knowledge, this is the first time to use M.O. with Siamese neural network in order to perform crimes linkage.

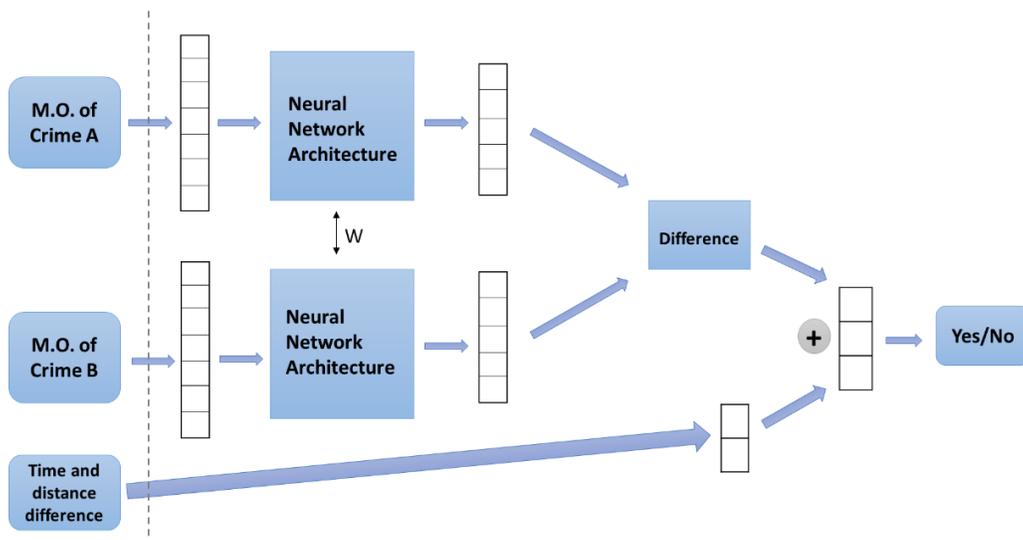


Fig. 2. Utilizing Siamese neural network in order to perform crime linkage

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