C. Forensic Identification

The National Research Institute of Police Science (NRIPS) and Criminal Investigation Laboratories (CILs) of the MPD and the prefectural police conduct close analyses and examinations on evidence. In order to identify an individual at a high degree of accuracy by examining minute specimen left at the scenes, DNA profiling is conducted by all CILs.

The NRIPS also established the Training Center of Forensic Science to provide training for CIL specialists to improve and standardize the quality of examination techniques.

3. National Research Institute of Police Science

The NRIPS is a comprehensive research institution to promote the development of science in support of police activities.

The institute has three major missions: research and development; examination and analysis; and technical guidance. Many research and development projects in various fields are conducted with needs of the prefectural police in mind.

The following are recent major research projects:

A. Evaluation of Rapid DNA Analysis Systems

Although DNA typing technologies are valid and reliable, it can be labor-intensive and time-consuming. We are evaluating Rapid DNA Analysis systems which perform DNA extraction, PCR amplification, size separation, fragments detection, and data analysis in a single self-contained platform without human intervention within 90 minutes.
B. Human Identification from Gait Footages: Taking Advantage of Two Different Methods

Currently, human identification from gait footages has been used for forensic purpose using Gait Verification Software developed by Osaka University. This is technically an appearance-based method that is very useful if the footages are under the condition to take advantage of features of figure information. However, if the condition becomes far from an ideal case, the recognition rate drops. The major factors of its difficulty are low-frame rate and clothing variation.

Focusing on the individuality of dynamics not only figures, we construct a novel gait analysis method inspired by the model-based method. It is found that this method sometimes takes more advantage in the case of low-frame rate or clothing variation. In the future, we will combine these two methods to overcome current difficulties and obtain more reliable analysis methods.

C. Application of DNA analysis to trace botanical evidence

Small plant fragments are often found as trace evidences, but their characteristic morphologies are lost and inadequate for forensic discrimination by observing and describing. With recent technical advances, botanical fragments can be analyzed by DNA analysis. For example, it has been revealed that sequences of particular loci of chloroplast DNA are identical among the same plant species, and now the data of such DNA sequences are easily obtainable from a public database. DNA analysis has already been introduced to analyze forensic practical samples in our laboratory. Further, we are developing methods to analyze forensic samples such as aged samples, cooked materials and mixture of plant fragments.
D. Speech and Language Analysis for Estimating the Speakers’ Origin

Recent widespread adoption of mobile technology and implementation of security cameras have brought us more opportunities to obtain crime-related digital data including speech. Speech as well as written language convey information on the individual's social and regional backgrounds, such as gender, generation, where s/he grew up, and where s/he lives. Phonetic and linguistic analysis of spoken and written language materials can help identify, narrow down, or profile the suspects. We are investigating the methodology of the analysis and collecting data on regional variations in language in order to build a dialect atlas.

E. Analysis of Event Data Recorders

Event Data Recorder (EDR) is a function to record the information of motor vehicles and occupants for a brief period of time before, during and after a crash event.

We have evaluated the characteristics and accuracy of EDR by various crash tests data. Therefore, we can analyze the EDR of vehicles in real accidents using the results of the evaluation study. Moreover we are developing the analysis method of EDR in vehicles with Advance Driver Assistance System (ADAS). It could contribute the accident analysis of self-driving vehicles.