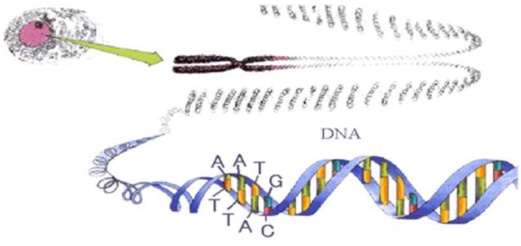
C. Forensic Identification



DNA Structure

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

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

Collecting DNA samples

DNA profiling

3. National Research Institute of Police Science

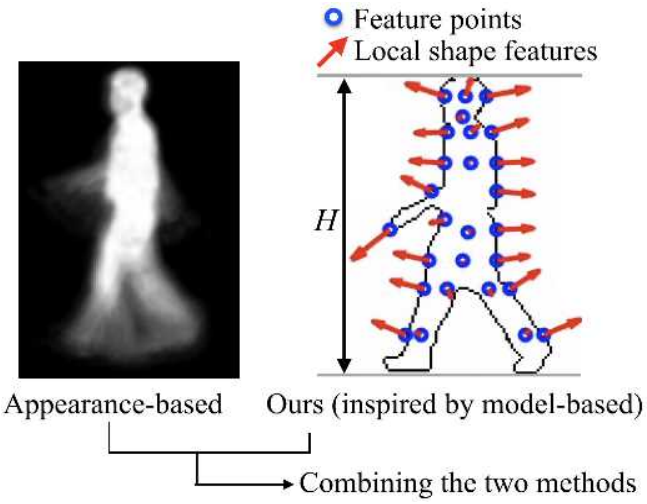
NRIPS is a comprehensive research institution to promote the development of science in support of police activities.
The institute has three major missions: research and development; examination and analysis; and technical guidance. Many research and development projects in various fields are conducted, considering the needs of the prefectural police.
Following are recent major research projects:

A. Development of mRNA-based body fluid identification

Quantitative PCR instrument

Body fluid identification of biological forensic samples provides important probative evidence for criminal investigations. However, some conventional procedures should be improved because of their insufficient specificity and detectability. For example, the results of α-amylase activity-based presumptive tests for saliva should be interpreted carefully because the α-amylase activities are also found in other body fluids. NRIPS therefore has investigated the applicability of mRNAs which are characteristically and highly expressed in the targeted body fluids, and successfully developed a more specific quantitative RT-PCR procedure for discriminating saliva from other body fluids.

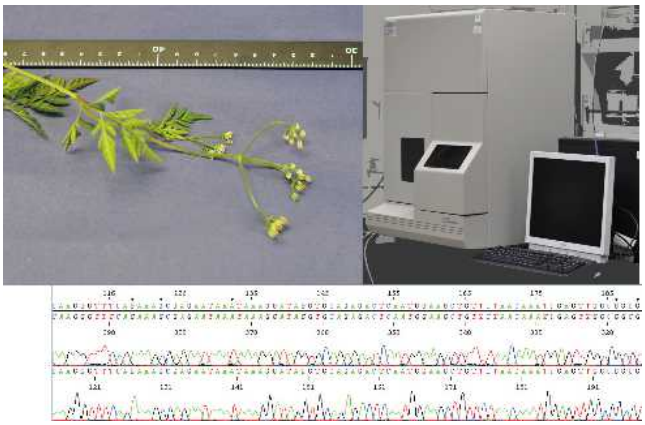
B. Human Identification from Gait Footage: Utilizing Two Different Methods



Currently, human identification from gait footage is used for forensic purposes using the Gait Verification Software developed by Osaka University. This appearance-based method is very useful when the footage is under certain conditions to yield adequate features of the figural data. However, the identification rate drops when the conditions are not sufficient. Major difficulties of the approach are the low-frame rate and clothing variations.

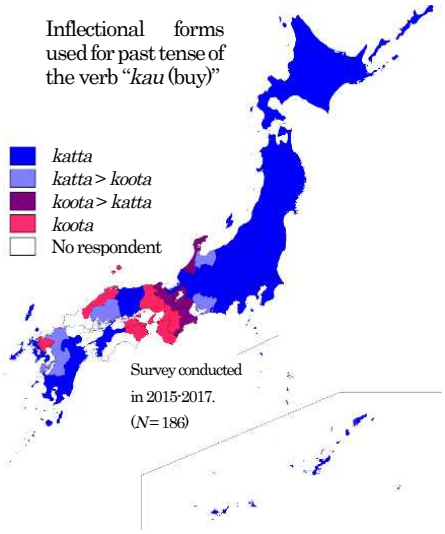
Focusing also on the individuality of dynamics in addition to the figures, NRIPS has developed a novel gait analysis method inspired by the model-based method, which is found to yield more reliable identification results in some cases of low-frame rate or clothing variations. NRIPS plans to combine these two methods to overcome the 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 evidence, but their characteristic morphologies could be lost or inadequate for forensic discrimination by observation or description. Recent technical advances, however, have enabled DNA analyses of botanical fragments. For example, it has been discovered that sequences of particular loci of chloroplast DNA are identical among the same plant species, and such DNA sequences are easily obtainable from a public database. DNA analysis has already been adopted for forensic analyses of practical samples in the NRIPS laboratory. Furthermore, NRIPS is developing methods to analyze wider types of forensic samples such as aged samples, cooked materials and mixtures of plant fragments.

D. Speech and Language Analysis for Estimating Speakers' Origins



Recent widespread adoption of mobile technology and installation of CCTV cameras has expanded opportunities to obtain crime-related digital data including speech. Speech as well as written language conveys information on the individuals' social and regional backgrounds, such as gender, generation, where the individuals grew up, and regions of residence. Phonetic and linguistic analysis of spoken and written language materials can help identify, narrow down, or profile suspects. NRIPS is researching analytical methodologies and collecting regional variations of linguistic data in order to develop a dialect atlas.

E. Analysis of Event Data Recorders

An Event Data Recorder (EDR) is a system to record information about motor vehicles and their occupants for a brief period of time before, during and after crash incidents.

Characteristics and accuracy of the EDR were evaluated against various crash test data. Therefore, the EDR of real accidents can be analyzed using the accumulated study results. Moreover, the EDR analysis method of vehicles with Advanced Driver Assistance System (ADAS) is being developed, which could contribute to accident analysis of self-driving vehicles.