



Research Program 3b Data science

Dr. Jérôme Bovet
Feuerwerkerstrasse 39
CH-3602 Thun
Tél +41 58 468 27 15
Fax +41 58 468 28 41
gerome.bovet@armasuisse.ch



Today, data is at the core of all operational decisions, and this is certainly the case in the area of defence. The research program in data science is a key contributor towards building expertise in developing military capacities in the areas of intelligence and operations. This expertise is developed through innovative research projects that include concept demonstrations and field experiments to validate key findings.

Information and communications technology (ICT) is an important resource in our society, be it in the economy, industry or in government. These systems produce and exchange large amounts of data, which today represents great value, from which a lot of information can be obtained. One outcome of these rapid advances is modern wars and conflicts around these IT systems, in order to weaken state operations, and unfortunately, Switzerland has not been spared from such attacks.

In situations where IT is under attack, data science generates new opportunities related to data collection and data mining to gain a tactical advantage against potential adversaries. Thanks to the use of adapted techniques, it is possible to detect illegal activities in these systems, but also to obtain information on potential adversaries and their intentions.

The research program focuses on strengthening expertise in the areas of data acquisition, data management, processing and analysis, as well as their protection against fraudulent utilisation. The emergence of new algorithms and mathematical models has made it possible to identify new relationships and to discover new phenomena from data.

These new approaches, however, not only create new opportunities, but also induce risks that need to be assessed. As a result of rapid technological evolution and the constant growth of threats, the research program is continuously adapted to new challenges in an agile manner.

The acquired expertise and findings are transitioned to operational units of the Armed Forces to support them in their intelligence and cyber defence operations. In order to identify the key information enabling decision-makers to gain a tactical advantage in these operations, it is necessary to be able to process large quantities of heterogeneous data within a short period of time.

The research program in data science assures the availability of the required technological expertise with the help of an extensive international network of experts, made up of universities, industry and governmental partners.



Areas of expertise



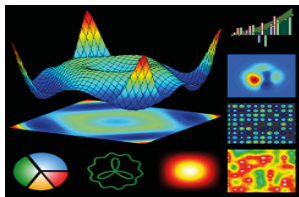
Data acquisition

Various sources and types of data are available, be it through social networks, the Internet of Things or public databases. All of this data offers new possibilities, but requires different methods of acquisition, having to consider the veracity and spatio-temporal aspects of the data. The new approaches based on participatory platforms or open sources are very promising.



Data management

In terms of operational conduct, it is imperative to have the right information with good quality and at the right time. Expertise is being developed in order to be able to evaluate information systems and modern infrastructures, taking into account the increasing quantity of data (big data problematic), its speed and heterogeneity.



Data processing and analysis

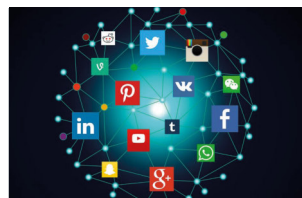
Algorithms based on machine learning are being reviewed in order to identify patterns and the recurrences across data sets. These activities have a wide range of potential applications such as detecting anomalies, classifying signals, texts, languages and images as well as analysing graphs.



Data protection

Nowadays, data forms the basis of operational decisions. It is therefore necessary to ensure that it is not manipulated by adversaries, and that the decision models are robust in the face of attacks. In addition, the protection of personal data from persons and institutions must be guaranteed against fraudulent use.

Technology demonstrators



Social media intelligence

The evaluation of information procured from social networks poses new technical and analytical challenges. Using a demonstrator, armasuisse S+T examines the new processes and technologies for researching information, as well as analysing and visualising data from social networks, and presents it in a simple manner.

Networks

The requisite professional skills build on a broad network of partners from business, universities (including universities of applied science) and other research units in Switzerland and abroad. To ensure that these skills are properly developed, there is close contact and an ongoing exchange of information with users and with planning, procurement and testing units within the DDPS.

State partners / federal government

- Swiss Armed Forces
- Federal Intelligence Service FIS
- Federal Office of Police FEDPOL
- Federal Statistical Office FSO
- NATO
- US Army Research Lab

Universities, universities of applied sciences/industry

- EPFL
- ETH Zurich
- University of Fribourg
- University of Zurich
- University of Lausanne
- HES-SO
- KU Leuven, BEL
- IMDEA, ESP
- Kudelski Security