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EPITA Research and Development Laboratory

The EPITA Research and Development Laboratory (LRDE) has been created at the beginning of year 1998 at EPITA, a private university in computer science located in the South of Paris, France.

The different skills of LRDE's members cover various fields of computer science :

- Image and Signal Processing
- Computer Vision
- Fuzzy Sets Theory
- Numerical Analysis
- Compilation
- Program Transformation
- Automata Theory
- Metaprogramming
- Software Engineering
- Object-Oriented Scientific Computing
- Grid computing
- Distributed Software

Staff

The LRDE's permanent staff is composed of seven young computer researchers, several of them being involved in the free software community. A dozen among the best one percent of EPITA's students join our team to work on research projects.

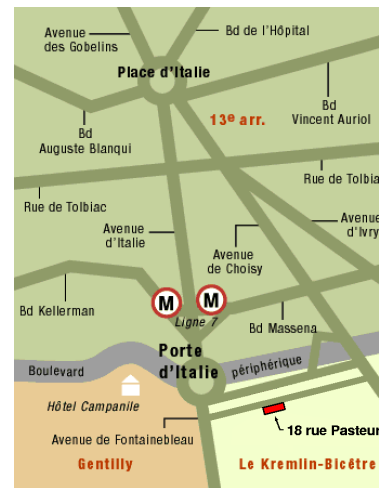
Collaborations

- *ENST* : Vaucanson, a finite state machine manipulation platform
- *CNRS/ INRIA* : within the interdisciplinary national program on Robotics, ROBEA
- *Institut Curie* : recognition of cancerous cells in cytology

Industrial research

- *CEA (French Atomic Energy Agency)* : pattern recognition
- *SWT* : automatic classification and indexation of heterogeneous documents
- *Bouygues Telecom* : distributed system within a multi-agent framework dedicated to mobile services

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Projects

Olena

Image processing, C++ static programming

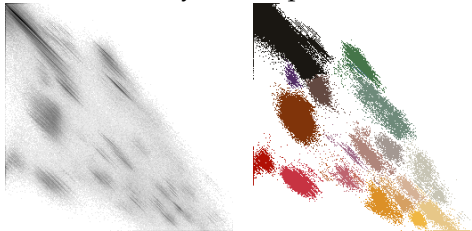
Olena is a C++ library dedicated to image processing and pattern recognition. In this library algorithms are written once, but are able to deal with images having various structures (regular lattices, graphs, etc.) and different data types (many integer, floating and color encodings, etc.) Algorithms provided by Olena are both generic and efficient.

Olena is also effective for us to perform research on image processing.

Olena is free software.



Kandinsky's "Composition X"



Color identification in feature space

Vaucanson

Finite State Machine, C++ generic programming

Vaucanson is a finite state machine manipulation platform, a joint project ENST/EPITA. Finite state machines (also called automata) are useful in language processing or automation.

In the past, such platforms were intended to work either at an industrial scale, specialized in letter automaton (FSM) to be efficient, or in a pure abstract way (FSA). Using static and generic C++ programming, Vaucanson tries to respond to both trends.

Indeed, our framework is the set of automata with multiplicity over any semiring : a general algorithm is written just once and can be statically instantiated to any particular kind of automaton. As a result, we obtain efficient code from algorithms written in an abstract way using basic primitives taken from the C++ library.

People not fluent in C++ can also use the platform through an interpreter that is built to reflect all the potential of the system. Then, we expect that the framework will enable researchers to experiment their ideas and novices to practice their skills in an intuitive way.

Transformers

Parsing, Program Transformation, SGLR, C++/Meta-programming, Optimization

Thanks to `template`, and almost by accident, C++ is a very special language where not only you can describe what your program will do, but also how the compiler will run. This feature gave birth to powerful programming techniques, commonly referred to as "meta-programming". Because of its commitment in the Olena and Vaucanson projects, the LRDE has developed an expertise in metaprogramming. Unfortunately the implementation is tricky and very error-prone.

Starting from the simple idea that "we want metaprogramming efficiency, but we don't want to write it", the Transformers project was initiated. It aims at converting naive (but decent) C++ programming into high-speed (but indecent) C++ source code. To this end, several tasks must be addressed : basically the Transformers project aims at designing a set of tools to manipulate the C++ language.

Free software development

Maintenance of the free software :

- GNU Autoconf
- GNU Automake
- GNU a2ps
- GNU Bison
- Gnus
- XEmacs