BioAlps

Life Sciences Cluster Western Switzerland

Big data and bioinformatics
Merging the fields of biology, technology, and medicine

The rapid growth in data is astounding in terms of volume, speed, veracity and variety of data sources from genome sequencing experiments, biological and biomedical imaging that generate large volumes of data. The ability to store, process, analyse and view this data is gaining momentum in the Western Switzerland's healthcare industry. The Swiss pharmaceutical industry recognises that bioinformatics is crucial for validating potential drug targets and for determining which ones are the most suitable for entering the drug development pipeline.

THE USE OF BIOINFORMATICS IN DRUG DISCOVERY COULD REDUCE THE R&D COSTS FOR NEW DRUGS BY 50%. SWITZERLAND HAS THE HIGHEST CONCENTRATION OF BIOINFORMATICIANS WORLDWIDE.

Switzerland is among the top ten industrialised countries in the world in terms of ICT readiness and one of the big data development hubs for life sciences. The global bioinformatics market accounted for $4.2 billion in 2014 and is poised to reach $13.3 billion by 2020 with a CAGR of 20.9% from 2015 to 2020[1] driven by the increasing use of bioinformatics in drug discovery and biomarkers development processes which could lead to a reduction in R&D costs for new drugs by 50%[2]. Switzerland has the highest concentration of bioinformaticians worldwide.

The Swiss Institute of Bioinformatics (SIB) whose services, software tools and databases are used worldwide by researchers in life sciences with more than 900,000 requests per month, created the first web server in life sciences known as ExPASy.

The Human Brain Project (HBP)[3], a 10-year scientific research project, established in 2013, federates hundreds of researchers, from 112 partner institutions in 24 countries, is coordinated by the Swiss Federal Institute of Technology in Lausanne (EPFL). The HBP enables data sharing, reconstruction of the brain at different biological scales and the development of brain-inspired computing systems.

The Lausanne Institutional Biobank (BIL) is currently developing Europe's largest biobank with biological samples donated by the general population. A bioresource for research purposes, sequencing is being used to understand population-based medicine and move towards personalised medicine.

"Big Data" has proliferated Western Switzerland's bioinformatics companies such as Sophia Genetics and Precision Medicine Group that specialise in outsourcing services such as sequencing or prospecting for disease-specific biomarkers into a predictive tool.

BioAlps region brings together more than 1000 people as big data practitioners, researchers, students, clinicians, health IT experts, and data scientists to improve the state of our healthcare systems.

Western Switzerland, yet again, is demonstrating that it is a hotbed of innovation and excellence by delivering on the promise with big data infrastructure investments and tools of the highest scientific standards.

[1] www.alliedmarketresearch.com/bioinformatics-market

[2] link.springer.com/article/10.1007/S13721-013-0039-5

[3] www.humanbrainproject.eu/
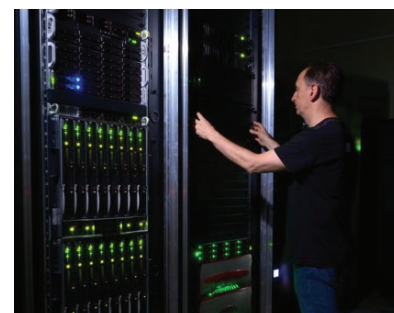
SIB SWISS INSTITUTE OF BIOINFORMATICS

The Swiss Institute of Bioinformatics (SIB) is an academic, non-profit foundation established by leading researchers in 1998 with the backing of a few visionary Swiss politicians. With offices on the campus of the University of Lausanne (UNIL), SIB is at the frontier of life science and computer science. The organisation provides high quality bioinformatics resources and services to the national and international life science community and coordinates research and education in bioinformatics throughout Switzerland.
Through its bioinformatics core facilities, high-performance computing centres, and embedded bioinformaticians, SIB provides expert data analysis services and computing power to Swiss and international life scientists, thus enabling them to perform biomedical research and analyse the resultant data. SIB provides continuing education in bioinformatics. SIB has 16 institutional members, which span all the major universities of Switzerland and other research institutions. Its 56 research and service groups develop, maintain and provide core bioinformatics resources for all areas of the life sciences. SIB belongs to several prestigious international networks, such as the Global Alliance for Genomics and Health and the European Life Science Infrastructure for Biological Information (ELIXIR).

BRAINS, DATA AND THE LIFE SCIENCES – A STRONG COCKTAIL IN THE BIOALPS REGION

Working hand in hand with companies, the research institutions in Western Switzerland provide a wealth of big data knowledge and bioinformatics tools that span all disciplines of the life sciences, not just human health.

Find more information in our extensive database: bioalps.org/community/ and, for the six Alpine regions, alpslifesciencesearch.com

The non-exhaustive lists below showcase some examples of the work being done in the region.

ACADEMIC INSTITUTIONS AT THE FOREFRONT OF BIG DATA AND BIOINFORMATICS IN WESTERN SWITZERLAND

University of Lausanne UNIL	Swiss Institute of Bioinformatics (SIB)	High quality bioinformatics resources and services	unil.ch
University Hospital of Lausanne CHUV	Department of Laboratories Lausanne Institutional Biobank (BIL)	DNA biobank for genetic research	chuv.ch/biobanque
University of Geneva UNIGE	SIB, computing sciences	Basic research, evolutionary genetics and phylogenetics.	unige.ch
University Hospitals of Geneva HUG	School of medicine, department of genetics and evolution		hug-ge.ch
University of Applied Sciences Western Switzerland HES-SO	Geneva -Department of Information sciences	Computing research	hes-so.ch
	Valais - Institute of Business Information Systems	Content-based medical image retrieval	medgift.hevs.ch/silverstripe
Ecole Polytechnique de Lausanne EPFL	SIB	High quality bioinformatics resources and services	epfl.ch
	Brain Mind Institute (BMI)	Blue Brain Project	sv.epfl.ch/neurosciences
Ludwig Institute for Cancer Research	SIB	Brain cancer	ludwigcancerresearch.org
University of Fribourg UNIFR	SIB Department of medicine	Sports modelling, artificial intelligence	unifr.ch
University of Bern UNIBE	SIB Department of medicine	Genome analysis, modelling	unibe.ch
Haute Ecole d'ingéniérie et de Gestion HEIG-VD	Biomedical engineering group	Biomedical data mining	heig-vd.ch/rad/biomed

A SELECTION OF BIG DATA AND BIOINFORMATICS COMPANIES IN THE BIOALPS CLUSTER

1DROPDIAGNOSTICS	Dosage for prescription based on patent's medical history and biological parameters stored on a remote databank	1dropdx.com	**GENOHM**	Laboratory Information Management System (LIMS)	genohm.com
AARDEX	Cloud-based platform to measure and monitor patient adherence to medication	aardexgroup.com	**GENOMSYS**	Solution and systems for efficient genomic information processing	genomsys.com
CEREBRO	Cloud platform for quality control and benchmarking of imaging biomarkers	cerebro.pro	**PRECISION FOR MEDECINE**	Biomarker technological platforms such as genetics, transcriptomics, protein assays and cellular assays	quartz.bio
CYTEL	Statistical software for designing every type of clinical trial, including adaptive designs	cytel.com	**SAPHETOR**	Data-driven solutions based on NGS for precision medicine (cancer, rare & cognitive diseases)	saphetor.com
DATA MINING INTERNATIONAL	Data management, data extraction and data analysis	datamining-international.com	**SIMPLICITYBIO**	In-silico biomarker diagnostics based on genomics and proteomics	simplicitybio.com
DRUGDESIGNTECH	Knowledge management and decision support for both biologic therapeutics and traditional small molecule drug discovery	drugdesigntech.com	**SMARTGENE**	Genetic sequencing data-managment software solutions for medical research and clinic diagnostics	smartgene.com
GENEBIO	Multifaceted informatics for the life sciences; commercializes products developed by the SIB	genebio.com	**SOPHIA GENETICS**	Software modules covering bioinformatic analysis genetic tests results and patient DNA sequence data through safe storage and sharing	sophiagenetics.com

The fact sheet provides a view of the key players in the sector at any given time; it is not comprehensive and is subject to regular updates. This current edition was updated Autumn 2019.

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