Press Release

December 10th, 2020

Institut Curie and Google initiate a research collaboration using artificial intelligence (AI) for the analysis of complex transcriptomic and epigenetics data

Paris, December 10th 2020 - Institut Curie and Google initiate a joint artificial intelligence (AI) research program to develop and implement deep learning (DL) methods for the analysis of complex single-cell transcriptomic and epigenetics data. Obtained from mouse samples and cell lines, these valuable data sets will be used to develop new deep-learning algorithms. In the long term, this research project could help characterize the heterogeneity of tumors and predict resistance to treatment.

The emergence of new personalized medicine including targeted therapies is a major challenge for the treatment of cancer. Genetic heterogeneity within tumors is a key determinant of treatment response and resistance; sub-population of cells bearing a mutation conveying resistance can survive and be selected in a Darwinian process. In addition, epigenetic mechanisms are anticipated to play a role in the adaptation of cancer cells confronted with environmental, metabolic or therapy-related stresses. The last decade witnessed the development of new methods permitting the analysis of tumor cells at an unthinkable granularity few years ago but the analysis of these complex data remain challenging. At the cutting edge of innovation, Institut Curie's Dynamics of Epigenetic Plasticity in Cancer team (UMR3244 – Institut Curie, CNRS, Sorbonne Université) - under the supervision of Céline Vallot, PhD - and Google Lab - under the direction of Jean-Philippe Vert, PhD - initiate a pioneer collaboration to meet current challenges with the analysis of single-cell data.

Within this joint collaboration, Institut Curie and Google will combine their expertise in single-cell and deep-learning to develop breakthrough approaches at the bridge of data science and biology. More specifically, the expertise of Céline Vallot and her team will enable the generation of scChIP-seq data[1] obtained from mouse samples and cell lines. These valuable data sets will be analyzed and used by Google's team to develop new deep-learning algorithms in collaboration with Vallot's team. The objective of the collaboration? The use of deep learning approaches to study single-cell epigenomics and transcriptomics data in cancer, in order to characterize tumor heterogeneity and eventually predict resistance to treatment. This project aims to dig into the structure of the learning algorithms to extract information and interpret these components at the biological level.

"We are thrilled to collaborate with Céline Vallot and her team at Institut Curie on this ambitious and multidisciplinary project. Combining the latest technologies in cancer genomics and machine learning raises a number of challenges we will tackle together, and should ultimately allow us to better understand the disease and how to treat it" says **Jean-Philippe Vert, Research scientist at Google Research – Brain team.**

"Together, our objective is to leverage data science to unravel novel mechanisms of tumor evolution," adds **Celine Vallot, PhD, Head of the Dynamics of Epigenetic Plasticity Team at Institut Curie.**

Amaury Martin, Head of Institut Curie Technology Transfer and Industrial Partnerships Office & Institut Carnot Curie Cancer says**:** *"Institut Curie is very pleased to be the first research center selected by Google Research*

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[1] Single-cell chromatin immune-precipitation sequencing (scChIP-seq)

for a partnership of this nature. It reinforces our commitment to play a major role in the development of artificial intelligence approaches applied to life science."

PRESS CONTACTS

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About Google

Google's mission is to organize the world's information and make it universally accessible and useful. Through products and platforms like Search, Maps, Gmail, Android, Google Play, Google Cloud, Chrome and YouTube, Google plays a meaningful role in the daily lives of billions of people and has become one of the most widely-known companies in the world. Google is a subsidiary of Alphabet Inc.

About Institut Curie

Institut Curie, France's leading cancer center, combines an internationally-renowned research center with a cutting-edge hospital group that treats all types of cancer, including the rarest. Founded in 1909 by Marie Curie, Institut Curie employs 3,500 researchers, physicians, and health professionals across three sites (Paris, Saint-Cloud, and Orsay), working on its three missions: treatment, research, and teaching. A private foundation with public utility status, Institut Curie is authorized to receive donations and legacies, and thanks to the support of its donors, is able to make discoveries more quickly, improving treatments and quality of life for patients.

For more information, visit: **www.curie.fr**

Since 2011, Institut Curie is certified "Institut Carnot Curie Cancer". The Carnot label is a label of excellence granted to academic research structures with proven high quality and involvement in partnership research. Curie Cancer offers industrial partners the opportunity to set up research collaborations, benefiting from the expertise of Institut Curie teams, for the development of innovative therapeutic solutions against cancers from the therapeutic target to clinical validation.
For more information: http://www.instituts-carnot.eu/fr/institut-carnot/curie-cancer