



PAVICS

Imagery, text and geospatial Machine Learning applications in Montreal's booming ML landscape



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(1) CRIM



ESGF Face to Face 2017
San Francisco, 2017-12-07

RBC will join Silicon Valley tech heavyweights like Facebook, Google and Microsoft, along with Samsung and other global players that have made a presence in the city.

"(Montreal) is absolutely one of the hottest places not only in Canada but on earth right now," says Foteini Agrafioti, RBC chief science officer and Borealis AI head.

"It's become very, very attractive with the momentum that they've built."

While the Borealis labs work collaboratively, Agrafioti said the contribution of McGill professor Jackie Cheung as an academic adviser will allow the Montreal lab to focus on his expertise of natural language processing.

Part of RBC's focus is to develop technology to pick up early signs of seemingly disconnected events going on around the world by evaluating social media chatter and news in far-flung countries that could potentially have an impact on North American markets.

Even though heightened activity in Montreal is creating competition for companies looking to lure researchers, Agrafioti is hoping RBC will have home advantage.

"Our hope here is to be adding the voice of one Canadian business that does



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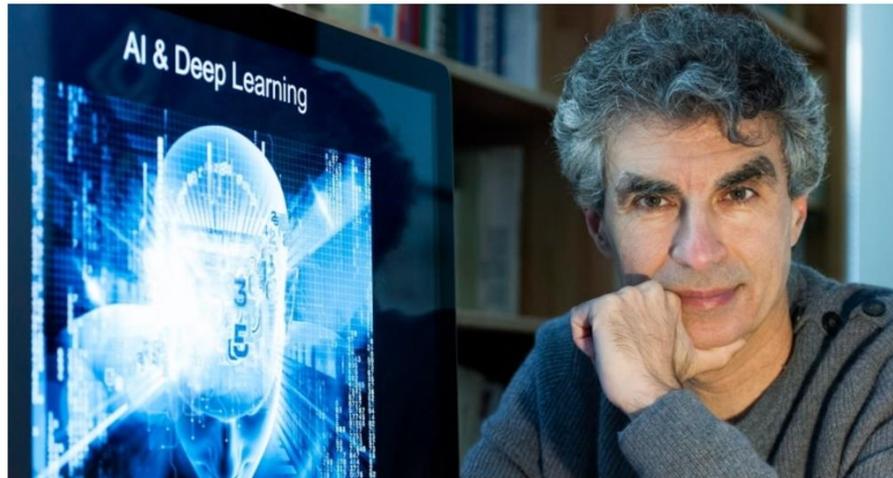
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Tech giants rush to invest in Montreal artificial intelligence research lab

'Right now is just the tip of the iceberg,' says head of the Montreal Institute for Learning Algorithm

Morgan Lowrie · The Canadian Press
[November 21, 2016](#)





Apprentissage automatique ✕

dans un rayon de 25 km de Montréal, Québec, CA

Groupes

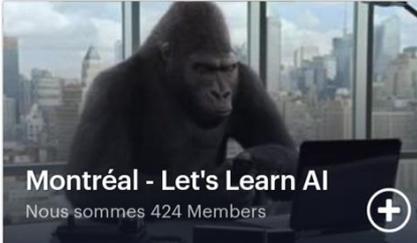
Calendrier



MTL Machine Learning
Nous sommes 1,028 Thinkers +



OakTree NeuralNetworks
Nous sommes 181 Members +



Montréal - Let's Learn AI
Nous sommes 424 Members +



Machine Learning Social Hack Night
Nous sommes 238 Members +



Montreal Artificial Intelligence and Deep Learning
Nous sommes 856 Makers +



Deep Learning Montreal
Nous sommes 1,777 Deep Learners +



Practical and Theoretical Machine Learning MTL (PTML-MTL)
Nous sommes 843 neurons +



AI MTL
Nous sommes 527 Curious Minds +



M.I.E. (Machine Intelligence Exchange) in Montreal
Nous sommes 77 Members +



Montreal to host two upcoming artificial intelligence conferences at Palais des congrès

By [Quinn Mason](#). Published on [October 30, 2017](#).



After all the recent announcements of major tech players opening artificial intelligence (AI) labs in Montreal, it should come as no surprise that the city has been selected to host two upcoming AI conferences at the Palais des congrès.

The *30th International Joint Conference on Artificial Intelligence (IJCAI)* will be coming in 2021 and attract nearly 3,000 experts from



DEC 6 Wed	6:00 pm ECom MTL @ Centre Cloud
DEC 7 Thu	4:00 pm Helios Makerspace Free Access
	6:00 pm PHP Quebec @ Centre Cloud
	8:00 pm TechNoel @ Notman House
DEC 8 Fri	9:00 am Les Pitonneux – Coffee & Code @ Cafe OSMO

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City emerging as an AI and ICT hub

With its world-renowned speakers, luminaries and advanced research centres, Montréal has become fertile ground and the quintessential setting for developing a topnotch scientific and professional program for ICCV delegates. In fact, the city enjoys the support of four major universities and is home to numerous centres specializing in fundamental and applied research in computer vision and machine learning, and is shaping the next generation of engineers and scientists in the field. These include the McGill University Centre for Intelligent Machines, an inter-departmental group formed in 1985 to facilitate and promote research on intelligent systems. The

city can also count on the reputable expertise of the Montreal Institute for Learning Algorithms (MILA) and the Institute for Data Valorization (Ivado), both associated with Université de Montréal, the Laboratory for Imagery, Vision and Artificial Intelligence (LIVIA) of the ÉTS school of engineering, Concordia University's Centre for Pattern Recognition and Machine Intelligence (CENPARMI), and the Computer Research Institute of Montréal (CRIM).



Convention city

Montréal hosts more international events than any other city in North America, according to the rankings released by the International Congress and Convention Association. Shortlisted for the *World's Best Congress Centre* award (AIPC) and the recipient of the highest quality standards certification in the industry, the Palais des congrès de Montréal enjoys the collaboration of leaders from various sectors, who in turn can count on the Palais' experience and support, in order to foster the international reputation of industries that are continually evolving.

About the Palais des congrès de Montréal



Non-for-profit organisation circa 1985

8.2M\$ budget

ISO 9001:2008 certified

4 R&D teams:

- Vision and imaging
- Emerging technologies and data science
- Speech and text
- Advanced software modelling and development

2016-2017 by the numbers

- 95 projects
- 166 clients
- 50 academic collaborators
- 11 scientific seminars
- 41 scientific publications
- 50 employees

*Économie, Science
et Innovation*

Québec 



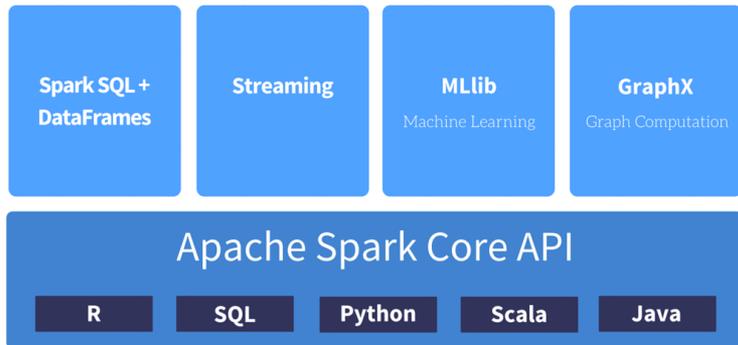
**NSERC
CRSNG**

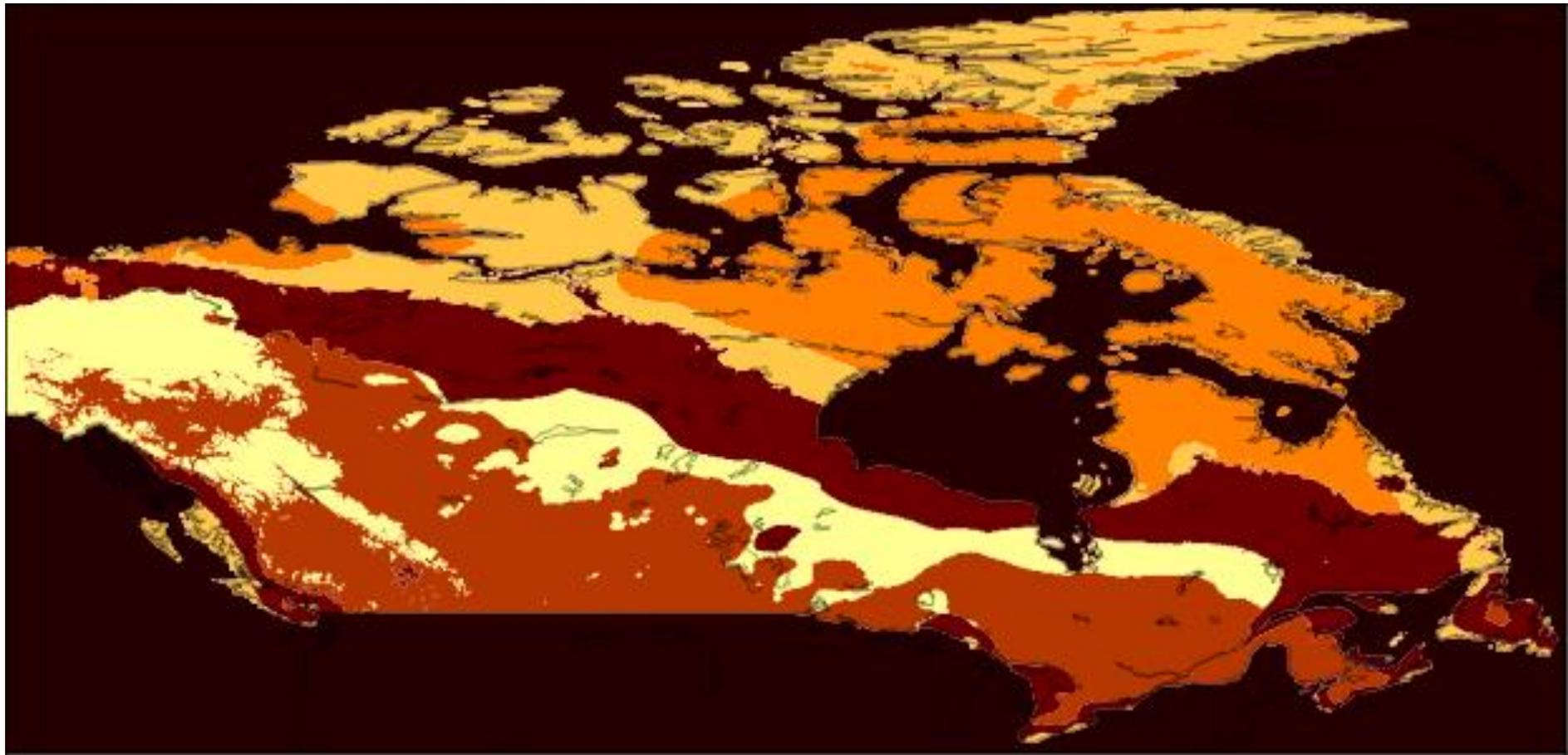
Scalable Machine Learning Using SciSpark

- Creation of time series from the 64 x 3 files
- Featuring (mean, std...)
- Principle Component Analysis (Spark ML)
- K-means (Spark ML)
- Daily 10km gridded dataset
- Precipitation & Temperature (1950-2013)



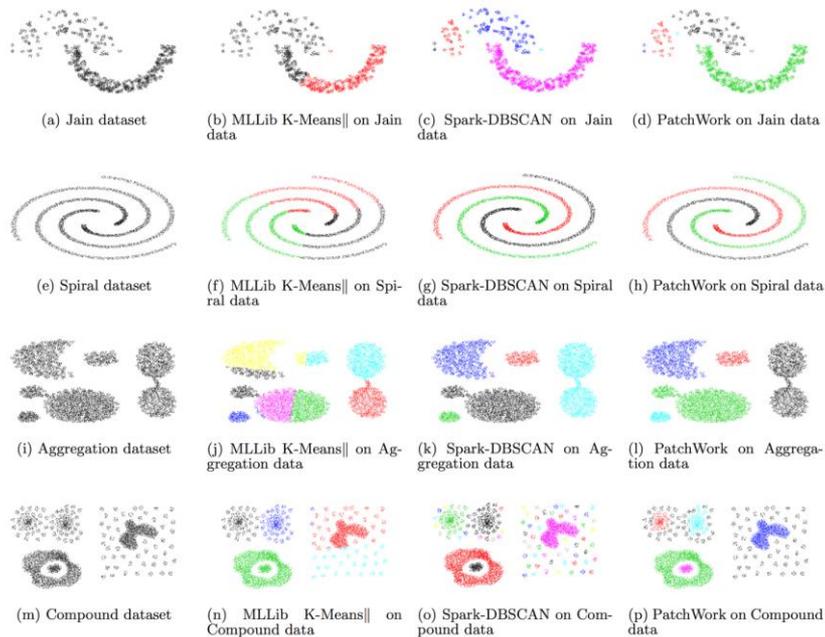
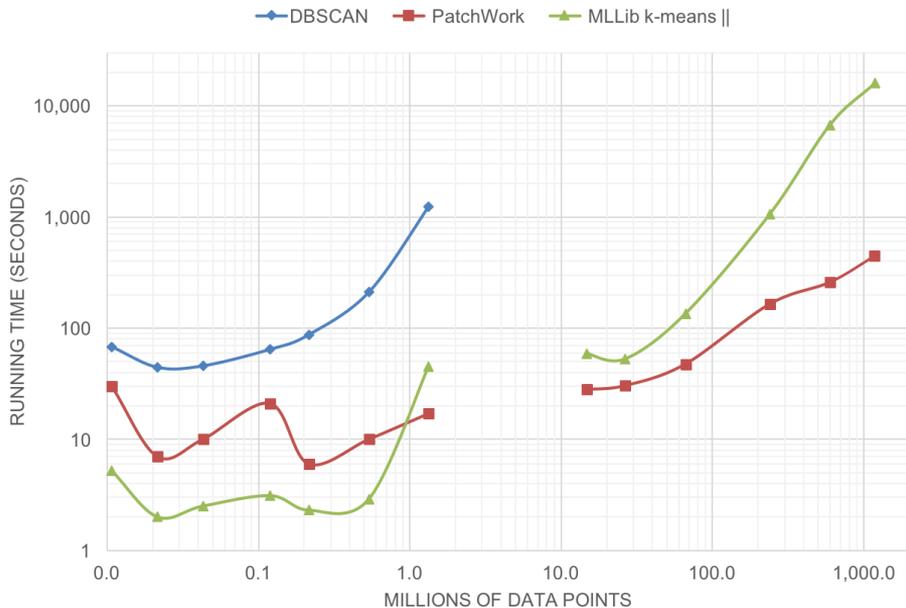
Ressources naturelles
Canada





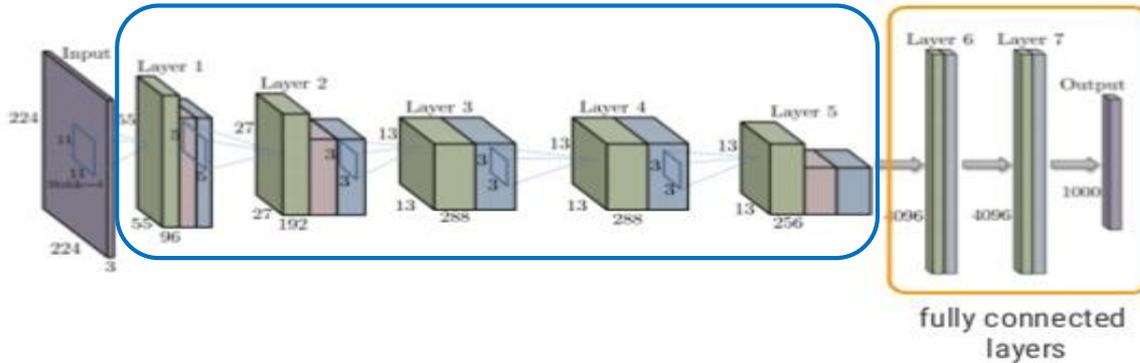
Highly Scalable Grid-Density Clustering Algorithm for Spark MLLib

It is a mixture of density and grid-based clustering algorithm. It has linear complexity and near linear horizontal scalability. As a result, PatchWork can cluster a billion points in a few minutes only, a **40x improvement over Spark MLLib** native implementation of the well-known K-Means



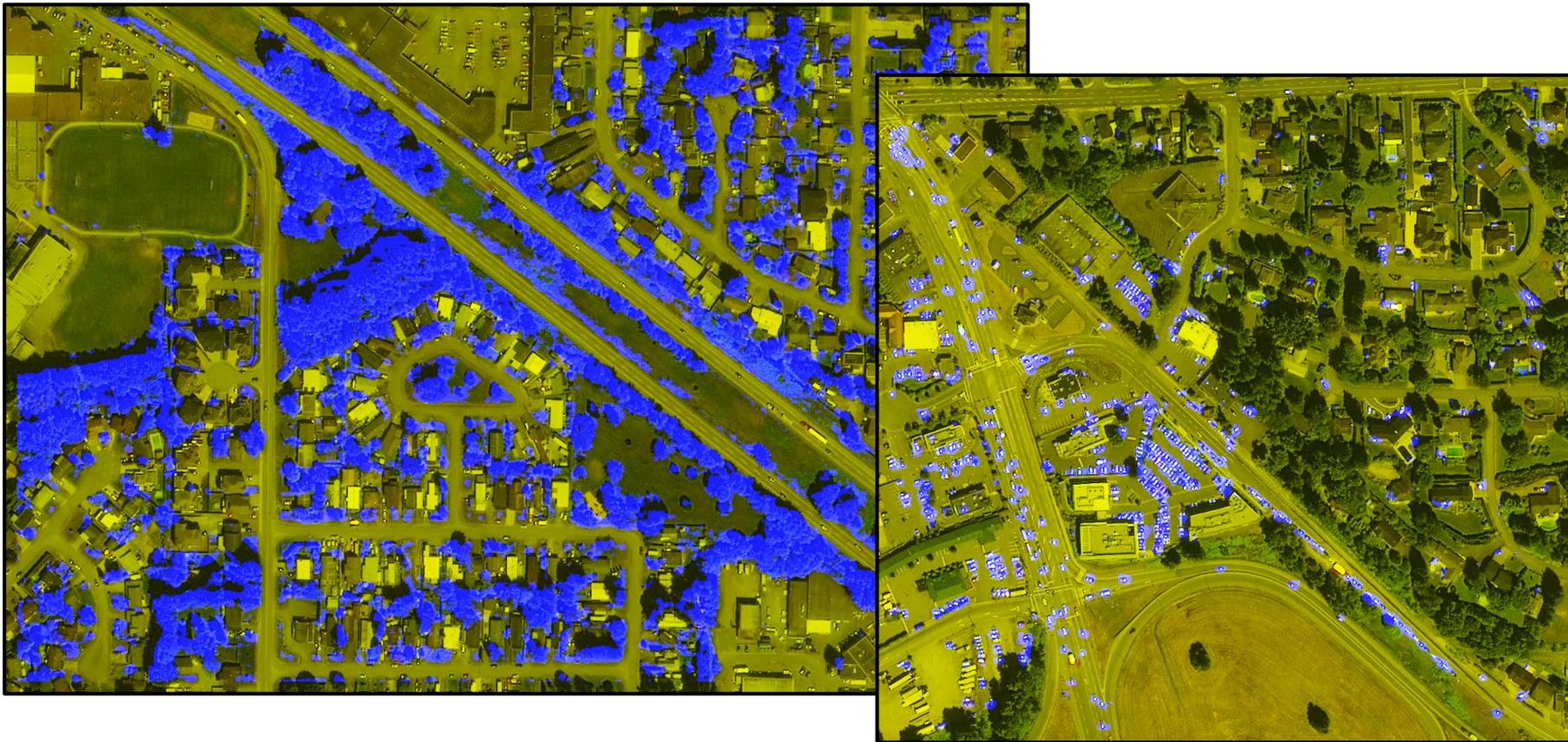
Classification and detection

- ‘Deep Features’ approach:
 - Uses an already trained network to produce features
 - A classifier is added
 - Different CNN trained with machine vision data *CaffeNet, GoogleNet, etc.)



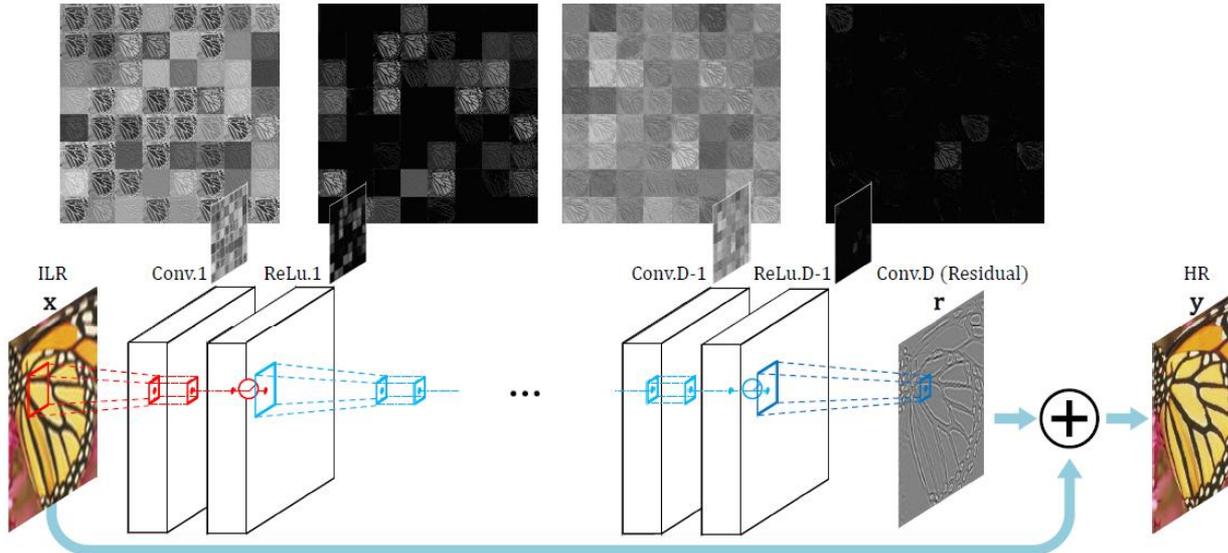
Babenko et al. (Moskowi), *Neural Codes for Image Retrieval* (2014)

Results on Pleiades imagery (50 cm)



Super resolution techniques

- ConvNet used to estimate missing high frequencies

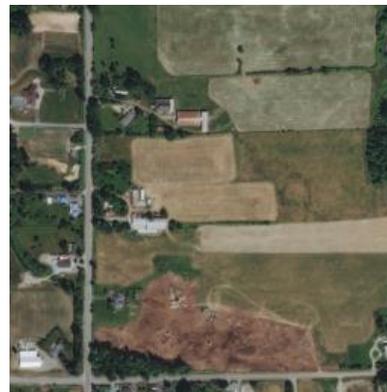


Ref: J. Kim, J. K. Lee and K. M. Lee, "Accurate Image Super-Resolution Using Very Deep Convolutional Networks," 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Las Vegas, NV, 2016, pp. 1646-1654.

5 to 2.5 meters per pixel



Gain of about 10% in performance



10 to 2.5 meters per pixel
Low resolution (bicubic)



Super-resolution



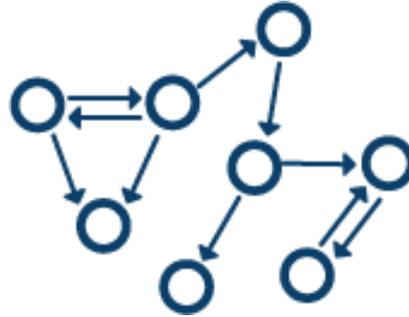
High resolution



Other applications of ML at CRIM

- Real-time speech transcription
- Vocal biometry
- Firewall logs access event detection
- Anormal event detection in airports
- People and car tracking
- Fire services response time
- Bike rental sources and destination
- Personalized product recomandation
- Active learning for user queries

- Many, many more...





Newsroom

Memorandum of Understanding regarding Cooperation in the field of Artificial Intelligence

Between The Government of Ontario and The Gouvernement du Québec

September 22, 2017 2:59 P.M. | [Office of the Premier](#)

Whereas Ontario and Québec (collectively, the "Parties") entered into a memorandum of understanding, dated October 26, 2016 (the October 2016 MOU) to work together to become leaders in supporting 5G technologies through opportunities such as the Evolution of Networked Services through a Corridor in Québec and Ontario for Research and Innovation (ENCQOR) and the Centre of Excellence in Next Generation Networks (CENGN);

And whereas the October 2016 MOU has allowed the Parties to advance a 5G test-bed to create opportunities for Ontario and Québec researchers and firms to create and shape transformative and disruptive technologies, including those stemming from artificial intelligence (AI);

And whereas the Parties agree that supporting the growth of the digital ecosystem is expected to allow other transformative technologies to develop in both provinces;

And whereas their commitment to an open innovation system to accelerate the growth of information and communications technologies extends particularly to the field of AI, which the Parties expect, in the fullness of time, to have such broad applications as to have a socio-economic

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Newsroom

News Release

Québec, Ontario and California Join Forces to Fight Climate Change

September 22, 2017 10:51 A.M. | [Office of the Premier](#)

Today, Québec Premier Philippe Couillard, Ontario Premier Kathleen Wynne and California Governor Edmund G. Brown further strengthened their cooperation in the global fight against climate change.

Premier Couillard hosted Premier Wynne and Governor Brown in Québec City to sign an agreement linking the carbon markets of Québec, Ontario and California.

By signing this agreement to integrate and harmonize emissions cap programs, Ontario will now formally enter the Québec-California carbon market, effective January 1, 2018. This will allow all three governments to hold joint auctions of greenhouse gas emission allowances and to harmonize regulations and reporting.

Today's agreement will accelerate progress on the three governments' leading work in the global fight against climate change, and demonstrates their shared commitment to achieving the objectives of the Paris Agreement as well as the value of governments working together across

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