Machine Learning

Florian Yger

HCERES Visit, 10/24/17
Themes of the project

Overall aim

How to learn optimal decisions from large amounts of data in a changing context?

Scientific challenges - at the cross-road between pole 1 and pole 3

- Representation learning (and invariance design)
- Learning for decision making under uncertainty
Themes of the project

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Applications

- Games
- Biomedical signal processing
- Recommender systems,...
Human resources

Permanent staff

J. Atif (PU, 100%) - 2014
T. Cazenave (PU, 50%) - 2009
Y. Chevaleyre (PU, 100%) - 2017
R. Laraki (DR, 20%) - 2013
B. Negrevergne (MCF, 100%) - 2016
F. Yger (MCF, 100%) - 2015
International collaborations with: Google Brain NY, Riken AIP, KU Leuven, etc
### Human resources

#### Non-permanent staff

<table>
<thead>
<tr>
<th>Name</th>
<th>Years</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>M. Cornu</td>
<td>2013 -</td>
<td>MESR</td>
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<tr>
<td>F. Labernia</td>
<td>2014-2017</td>
<td>MESR</td>
</tr>
<tr>
<td>S. Hadikhanloo</td>
<td>2014 -</td>
<td>AD/CEREMADE</td>
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<tr>
<td>A. Morvan</td>
<td>2015 -</td>
<td>CEA</td>
</tr>
<tr>
<td>C. Béji</td>
<td>2016 -</td>
<td>MESR</td>
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<tr>
<td>B. Doux</td>
<td>2017 -</td>
<td>MESR</td>
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<tr>
<td>R. Pinot</td>
<td>2017 -</td>
<td>CEA</td>
</tr>
<tr>
<td>Y. Laurin</td>
<td>2017 -</td>
<td>ENS</td>
</tr>
<tr>
<td>S. Nicolet</td>
<td>2017 -</td>
<td>PRAG</td>
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<tr>
<td>P. Meriguet</td>
<td>2017 -</td>
<td>Cifre Smith detection/CEREMADE</td>
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<tr>
<td>A. Araujo</td>
<td>2017 -</td>
<td>Cifre Wavestone</td>
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<td>N. Carion</td>
<td>2017 -</td>
<td>Cifre Facebook</td>
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<tr>
<td>T. Sohm-Quéron</td>
<td>2017 -</td>
<td>Cifre Brabham gardens</td>
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<tr>
<td>K. Osanlou</td>
<td>2017 -</td>
<td>Cifre Safran</td>
</tr>
<tr>
<td>G. Sileno</td>
<td>2016 -</td>
<td>postdoc fellow</td>
</tr>
<tr>
<td>M. Bon</td>
<td>2017 -</td>
<td>industrial associate</td>
</tr>
</tbody>
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Selection of thesis topics

- F. Labernia, *Modelisation, learning and preference prediction*, (J. Atif)
- C. Beji, *Uplift modelling and causal inference*, (J. Atif, F. Yger)
- R. Pinot, *Online sketching of structured data for machine learning under differential privacy*, (J. Atif, F. Yger)
- A. Araujo, *Dynamical optimization of machine learning applications*, (J. Atif, B. Negrevergne)
- B. Doux, *Detecting and understanding salient events in video game data*, (T. Cazenave, B. Negrevergne)
- S. Hadikhanloo, *Learning in Mean Field Games*, (R. Laraki)
Other resources

- **Academic projects:**
  - **national level**
    - PEPS-JCJC ADDICTED (2017), 10 Keuros
  - **international level**
    - ANR STAP (2017-2021, 137K), Partner, Consortium: TPT, Univ. Dauphine, IME Brazil

- **Industrial projects:**
  - CIFRE (Brabham gardens, Facebook, Safran, Smith detection, Wavestone)
  - CEA (thesis fundings)
Some achievements

Representation learning


Selection among 20 international journal articles and 38 international conference articles.
Some achievements

Learning and decision under uncertainty

- **T. Cazenave.** *Generalized rapid action value estimation.* **IJCAI,** 2015.
- **B. Negrevergne, T. Cazenave.** *Distributed nested rollout policy for same game.* In Computer Games Workshop at IJCAI. 2017.

Selection among 20 international journal articles and 38 international conference articles.
Some achievements

**Representation to cope with non-stationarity / changing contexts**


Selection among 20 international journal articles and 38 international conference articles.
Perspectives and scientific challenges

Summary
- recent project in rapid expansion,
- great quality and quantity of international collaborations and publications.

Participation to society’s next challenges
- incorporation of privacy constraints
- explainability of the decisions

Directions for 2017-2022
- reinforcement of the transversality of the project within LAMSADE, Dauphine, PSL
- capitalization on the existing collaborations (national and international)