Master AI-ViC

Artificial Intelligence & Advanced Visual Computing

Marie-Paule Cani (LIX), Erwan Scornet (CMAP)
Artificial Intelligence

Intelligent Systems operating on their own
• To achieve challenging tasks: decision, creation…
• Based on two complementary approaches
  – Modeling knowledge & reasoning mechanisms
  – Learning from examples
Deep learning, Reinforcement learning

At the fence between Computer Science and Applied Math
  – Need for excellent students (X, ENS, foreign universities)
  – With both theoretical & strong programming backgrounds
Artificial Intelligence…
Coupling with Visual Computing

Master in Computer Science (stepping away from MVA)
– Combination of a priori knowledge & machine learning
– Verification of rules, proofs of convergence…

Visual Computing: Processing multimedia contents
• Analyzing & editing masses of online contents (sound, video, 3D)
• Great domains to illustrate AI methods!
• Brings challenges (editing tasks) & solutions (artificial examples)
Examples of applications

• Processing audio-visual contents
  – Select & edit media (education, culture)
• Controlling vehicles & drones
  – Adapting to dynamic environment + obeying specified rules
• Synthesizing virtual actors
  – Communication, serious games, movies
• Designing, fabricating, controlling soft robots
  – From personal assistance to micro-surgery
• Data analysis in high dimension + statistical learning
  – Decision making for finance, banking, insurance…
Year 1: curriculum
Artificial Intelligence & Advanced Visual Computing

Based on track "Images, vision et apprentissage" in third year at l’X

September – December:
Machine Learning I (INF554)
Constraint-based Modeling and Algorithms for Decision Making Problems (INF555)
+ two courses among:
  - Digital representation (INF574)
  - Signal Processing (MAP555)
  - Image Analysis (INF573)

January – March:
Machine Learning II (MAP569)
Algorithmic geometry (INF562)
Computer animation (INF585)
Image synthesis (INF584) or Statistics in action (MAP566)

April – August:
Long-term internship
Year 2: curriculum
Artificial Intelligence & Advanced Visual Computing

September: Refreshers (Statistic or Informatic)

September – December:
Deep learning
Data analysis: topology in high dimensions
Computer vision, images & video processing
Advanced 3D graphics: smart geometry
Natural language and speech processing

January – March:
Reinforcement learning
Socio-emotional embodied conversational agents
Immersion and interaction with virtual worlds
Robot motion planning, verification and control of hybrid systems
Soft robots: simulation, fabrication, and control
Year 2: curriculum
Artificial Intelligence & Advanced Visual Computing

Weekly seminar: Law, ethics & recent technical advances

- Key-note talks from both institutional and industrial partners.

A long project:

- Industrial partners can propose real-world subjects
- Students will work on these from September to February (one day per week)
- Restitution in front of the companies and the professors of the program.

Long-term internship (starting in April)

- 6 months in a research lab (either in public institutions or private companies)
Career outcomes
Artificial Intelligence & Advanced Visual Computing

Upon graduation, students are expected to pursue with a PhD thesis or to join a company directly. Here is a non-exhaustive list of industries that are interested in the profile of students in AI:

- **Digital applications for smartphones, computers, or personal assistants** (Google, Facebook, Shazam, Apple, Snap);

- **Control of autonomous vehicles, drones and robots** (Valeo, Audi, Google, BMW);

- **Virtual reality, image & video editing, design and simulation of 3D virtual worlds** (Ubisoft, Dassault systems, Microsoft, Adobe, Sony, Nintendo)

- **E-commerce and online advertisement** (Criteo, Amazon, Google, Teads, Cdiscount, FNAC, eBay)

- **Financial, banking and insurance sector** (BNP Paribas, Société Générale, Barclays, HSBC, AXA).

++ Many start-ups not listed here.
Deadlines for application procedure:

May 6, 2018

on

https://portail.polytechnique.edu/graduatedegree/master/artificial-intelligence-advanced-visual-computing

More information on the scientific content:

http://www.lix.polytechnique.fr/Labo/Marie-Paule.Cani/MasterAI/doku.php?id=curriculum
Contact

For questions regarding the scientific content:
Marie-Paule Cani (marie-paule.cani@polytechnique.edu)
Erwan Scornet (erwan.scornet@polytechnique.edu)

For questions regarding the application process:
Cristina Rotaru (cristina.rotaru@polytechnique.edu)