UNIVERSITÉ CÔTE D'AZUR

INSPÉ
Académie de Nice

Ínría

LINE

Computational Neuroscience
Cognition
Memory
Mnemosyne
Brain & Body
Complex Systems

AIde

Artificial Intelligence Devoted to Education

AIDE is a project aimed at developing "computational learning/education sciences", i.e., study to what extent approaches or methods from cognitive neuroscience, linked to machine learning and knowledge representation, could help to better formalize human learning, focusing on the development of computational-thinking* through activities with tangible artefacts or low-tech setup.

(*) https://interstices.info/la-pensee-informatique

https://monurl.ca/20220621
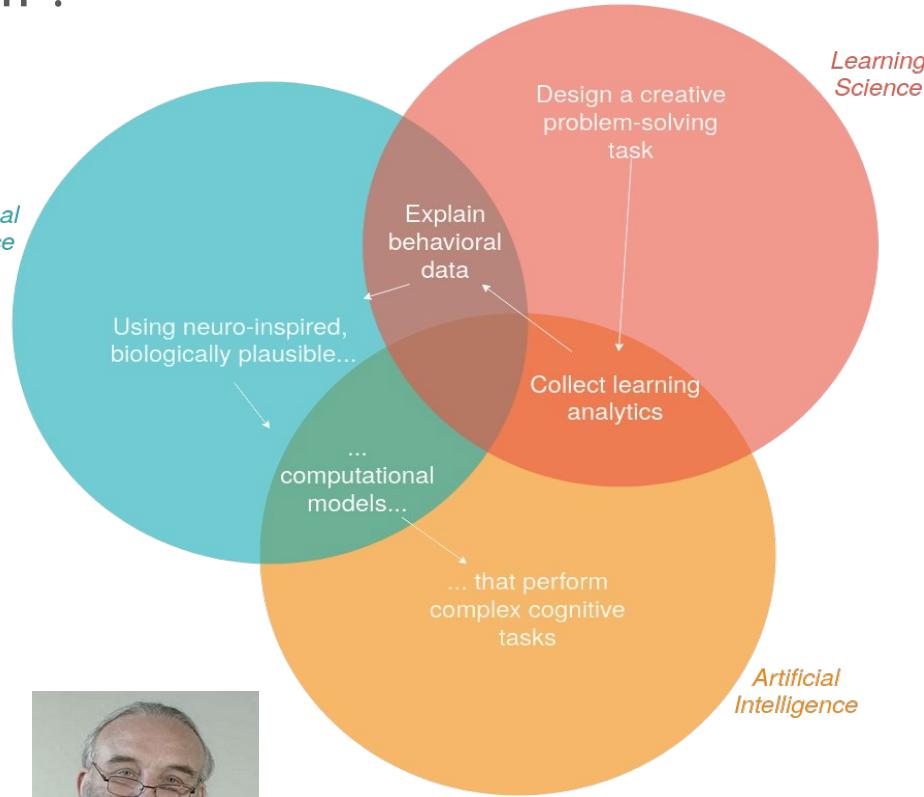
Who and Where from ?
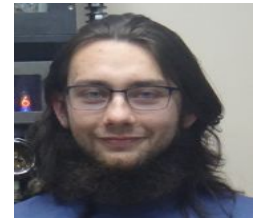

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and more …

https://team.inria.fr/mnemosyne/aide/#who

Learning Science

Computational Neuroscience

Design a creative problem-solving task

Explain behavioral data

Using neuro-inspired, biologically plausible...

Collect learning analytics

... computational models...

... that perform complex cognitive tasks

Artificial Intelligence

2

The socio-political challenge

⇒ 21st century skills education for *everyone*
⇒ Computational and critical thinking (CT) initiation

We MUST scientifically study
　　　　the way we teach how to learn such competences.

The three operational components

- At the theoretical level, use the machine learning formalisms as a model of the learner, as it can be done in computational neuroscience on another scale.

- At the experimental level, use machine learning tools to obtain more formalized, more reliable, and more automated measures of learning analytics variables related to a learning situation.

- At the pedagogical level, help the learner to understand in his own process of learning to learn, which is a matter of mechanical processes of what is creative and making these two aspects explicit.

The triple scientific disruption

D1 ⇒ Create a neuro inspired cognitive model of the learner behavior
engaged in a specific task

D2 ⇒ Use machine learning and symbolic formalism
not [only] as a tool but for modeling

D3 ⇒ Integrate both
symbolic (ontology modeling) and
numeric (bio-inspired neural network) mechanisms
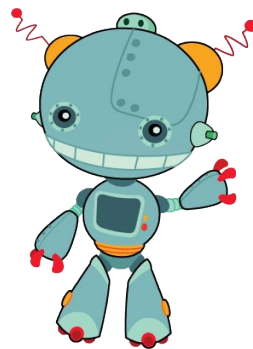
Ongoing task forces:

From a specific problem
to generic issues

T1 ⇒ Complex open-ended problem-solving requiring creativity
#creative-process #meta-control #strategies
⇸ computational cognitive architectures for creative problem solving

Direct contribution
to learning science

T2 ⇒ Learning task measure, analysis and modeling
#automation #observable-enlargement #data-clustering #model-based-analysis
⇸ formalizing and analysing observables using hybrid approaches
(a priori knowledge formalized in ontology + machine learning)

T3 ⇒ Cognitive processes neuroplausible implementation, especially symbolic
#common-sense-knowledge-representation #complex-data-implementation

Back to computational neuroscience

Beyond AIDE: twofold perspective

Provide to learning science some computational approaches elements at both the observable analysis and learner modeling levels.

Consider not only "lab toy setup" but realistic learning tasks as a lasting challenge for the computational neuroscience framework considered here (as it is already the case for others).