Post-doc or research engineer/data scientist position

AI4Embryo: artificial intelligence for better human embryo quality assessment in reproductive medicine

Deadline: January 15th 2024

Application: CV, letter of motivation & 2 letters of recommendation to herve.turlier@college-de-france

Duration: 24 months, from Mar 2024

Place: Collège de France
Center for Interdisciplinary Research in Biology
11, place Marcelin Berthelot, 75005 Paris, FRANCE

Supervision: Dr. Hervé Turlier, team leader

Team: *Multiscale Physics of Morphogenesis*   www.turlierlab.com

Salary: between € 2,866 and € 4,204 gross monthly depending on experience

Activities: Infertility is a global health issue faced by about 10% of couples worldwide. Since the advent of in vitro fertilization (IVF) techniques, the selection of the best embryo to transfer remains a major subject of research. Since two decades, medical incubators with embedded timelapse microscopy imaging allow the recording of the preimplantation embryo development until the blastocyst stage, and simplify the selection of embryo(s) by embryologists through the quantification of morphokinetic parameters, such as cleavage timings or blastocyst morphology. Recently, artificial intelligence (AI) algorithms have started being explored to automate the grading or selection of embryos, but they either don't exploit all available imaging data (3D+time) or don't combine it with patient's health and incubation parameters. The research project aims at developing state-of-the-art deep-learning approaches to extract relevant morphokinetic features of human embryo development and, building on the expertise of the team in early mammalian embryo mechanics [**1-3**], in the development of image analysis tools tailored to early embryos [**4-6**] and on established collaborations with two reproductive medicine units in two large public hospitals in France.
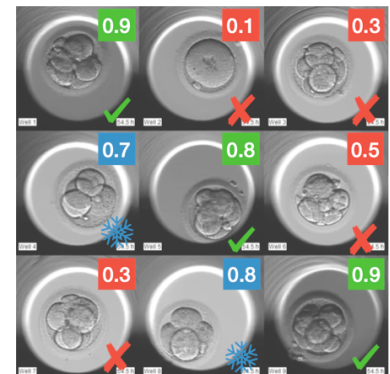
Missions: The successful candidate will develop several deep-learning approaches on various data modalities (videos, text, timeseries) to extract combined relevant embryo morphokinetic features, patient health characteristics and incubation parameters predictive of early human embryo implantation. She/he will work first on 3D reconstruction of cells shape from images, building on unpublished and published methods in the team, on the inference of its mechanical and dynamic features and on their multimodal statistical analysis with deep- and machine-learning methods. She/he will have to work in collaboration with biologists and with the team's software engineers. She/he will have to present her/his results at scientific conferences, write scientific articles and actively participate in the scientific and social life of the team and of the host Institute.

Expected profile: The candidate must hold a PhD (postdoc) or a Master (engineer) in applied mathematics or computer science. She/he should have excellent skills in computer science and programming (Python and some C/C++), and should already demonstrate expertise in implementing novel deep-learning methods. Prior experience in computer vision, multimodal analysis, and analysis of 3D medical images, 2D videos or temporal data series will be considered as strong assets. The candidate must have already demonstrated the ability to publish in international peer-reviewed conferences or journals (postdoc) or a strong potential for research (engineer). No prior knowledge in biology or medicine is expected, but a strong will to collaborate with medical doctors and a genuine interest for biophysical modeling is necessary. Strong work autonomy, initiative and scientific curiosity are key assets for this position. Fluency in English, excellent communication skills and motivation for collaborative and interdisciplinary research are naturally expected.

Working environment: The successful candidate will be welcomed into the interdisciplinary team "Multiscale physics of morphogenesis" led by Hervé Turlier and composed of ~10 researchers. We are committed to establishing a welcoming place for all and fostering inclusion and diversity. The team is located at the Collège de France, in the heart of the Latin Quarter in Paris. Integrated within the PSL University, and close to other major institutions such as the Ecole Normale Supérieure and the Institut Curie, the Collège de France constitutes an exceptional scientific environment unique in the world. The successful candidate will have access at an individual workstation in renovated premises, to a powerful laptop and to a high performance computing cluster fully dedicated to the team (12 GPUs, 396CPUs). The position does not pose any particular constraints or risks and 1 day of teleworking is possible per week.

[**1**] Maître, Turlier et al. ***Nature*** 2016
[**2**] Dumortier et al. ***Science*** 2019
[**3**] Firmin et al. ***Nature*** 2023 (in press)
[**4**] Ichbiah et al. ***Nature Methods*** 2023
[**5**] Ichbiah, Delbary & Turlier ***arXiv*** 2023
[**6**] Yamamoto et al. ***bioRxiv*** 2023