1) **Field of study :**

Graph theory, probability

2) **Internship topic :**

Glass ceiling in social networks

3) **Description :**

The glass ceiling, well documented by various organizations, has been defined as the invisible barrier that prevents minorities and women to access the higher levels of the hierarchy, independently of their qualifications and skills. In the paper [Avi], the authors formally define the glass ceiling effect in social networks and studies it by proposing a mathematical model which partially explains the causes of the glass ceiling. This model consists of a network with two types of vertices, representing two subpopulations, reflecting three types of well-known social phenomena:
The we lend to the rich mechanism
An unbalanced initial partition
Homophily, or preference for people who are like us
The authors prove that this model has a strong glass ceiling effect and that these three conditions are necessary, that is to say that by removing one of these three conditions, we will no longer see the glass ceiling effect defined as such. In this work, we will read the paper [Avi] and detail certain proofs the demonstration of which is only sketched. This requires basic knowledge on probability. We can also study some variations of this model and the speed of formation of the ceiling depending on the characteristics of the underlying graph with the tools presented in [Hard]. The work can be completed by performing simulations.

References
[Avi] C. Avin et al. Homophily and the glass ceiling effect in social networks In: Proceedings of the 2015 Conference on Innovations in Theoretical Computer Science. ACM. 2015, 4150.
[Hard] R. Durrett Random Graph Dynamics (2007), Cambridge University Press.

4) **Internship level :**

Master 2

5) **Requirements :**

Basic background in graph theory, probability

6)	**Duration :**	3 to 6 months
7)	**Period :**	February to July 2024
8)	**Laboratory :**	[LJAD](#)
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