# AI for DB (AI4DB)

**Homework 1 (Introduction to AI4DB and DB Background)**

**Instructor:** Xiang Lian

In this homework, there are 5 questions, covering topics of AI4DB overview, relational databases, and NoSQL databases. The maximum mark for this homework is **120 points**, which will be later scaled (to **12 points**).

1. Give at least two (2) types of data that we may encounter in AI/database related applications. **[10 points]**

2. **[AI4DB, 20 points]** Please list two (2) AI problems and two (2) database (DB) problems, as well as their real-world applications.

3. **[AI4DB, 20 points]** Are the following problems **[DB]** or **[AI]** problems? Tag them.

3(a). Find *k* taxis closest to my current location on road networks. **[4 points]**

3(b). Tell whether a photo contains a traffic light. **[4 points]**

3(c). Retrieve the employees' names whose salaries are above 100K from a spreadsheet. **[4 points]**

3(d). Automatically generate the code of computing the factorial of *n*. **[4 points]**

3(e). Search for a community (e.g., a clique subgraph) from social networks for online advertising. **[4 points]**

4. **[Relational Databases, 20 points]** Please describe one (1) type of the index used in the relational database, including the data structure and usage of the index for SQL queries over relational tables.

5. **[NoSQL Databases, 30 points]**

2(a). List two (2) types of queries on spatial databases, including their problem definitions (mathematically) and applications. **[15 points]**

2(b). List two (2) types of queries on graph databases, including their problem definitions (mathematically) and applications. **[15 points]**

**Bonus Question** **[20 points]** Challenge yourself to answer this bonus question for extra credits.

Please find one (1) AI4DB paper in top AI/DB conferences/journals (see the course website). Provide the information of this paper in a reference format (see below), and describe the problem definition and solution studied in this paper.

**References**

[1] FirstName1 LastName1, FirstName2 LastName2, and FirstName3 LastName3. Conference paper title. In *XXX*, pages XXX-XXX, 20XX.

[2] FirstName1 LastName1, FirstName2 LastName2, and FirstName3 LastName3. Journal paper title. In *XXX*, Vol. X, No. X, pages XXX-XXX, 19XX.

## Submitting Your Assignment

*All work must be your own. Copying other people’s work or from the Internet is a form of plagiarism and will be prosecuted as such.*

You may submit a Microsoft Word (.docx) document as an attachment using the **Canvas** Assignment tool. If you attach a document for your assignment, be sure to include your name in the text of the document and in the name of the document.

* Select this assignment in **Canvas** Assignment tool where you submit your work.
* You can submit multiple times, and only the last submission attempt will be considered for grading.
* Submissions sent by email will NOT be accepted.