

## Lecture 6: Materials, May 23<sup>rd</sup>

### Approximation Algorithms: Clustering Problem

#### 1. Announcement

Contents to be included in quiz on next week (May 30<sup>th</sup>)

(If you understand our content, then reminding yourself by reading our lecture note is enough for the quiz. The reading list below is required for students who cannot understand the content or want to know more detail about the topics.

- **Optimization Models and Linear Programming**

Reading: “*Formulating an Optimization Model: An Introductory Example*” (<http://www.4er.org/CourseNotes/Book%20A/A-I.pdf>), Page A-1 to A-17.

- **NP-Hardness**

Reading: “*Computers and Intractability: A Guide to the Theory of NP-Completeness*”, Pages 1-11.

- **Approximation Algorithm for Knapsack Problem**

Reading: “*The Design of Approximation Algorithms*”, Pages 13-16.

Reading: “*15-854 Approximation Algorithms: Lecture 10 - Dynamic Programming*”, Pages 1-2.

- **Approximation Algorithm for Vertex Cover Problem**

Reading: “*The Design of Approximation Algorithms*”, Pages 16-20.

#### 2. Approximation Algorithm for clustering problem

Our main textbook for the first half of this course is the following book.

Williamson and Shmoys, “*The Design of Approximation Algorithms*”, Cambridge University Press, 2010.

The book can be downloaded for free from the following URL.

<http://www.designofapproxalgs.com/book.pdf>

The content for  $k$ -center problem can be found at Chapter 2.2, and the content for  $k$ -median problem (last week) can be found at Chapter 9.2.

#### 3. Sparse Approximation of Kernel Methods

Contents we have discussed in this class can be found in the following papers.

Cortés and Scott, “*Scalable Sparse Approximation of a Sample Mean*”, Proceedings of the 39<sup>th</sup> IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2014), pages 5274-5278, 2014.

Cortés and Scott, “*Sparse Approximation of a Kernel Mean*”, IEEE Transactions on Signal Processing, Vol. 65, No. 5, pages 1310-1323, 2017.