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CSci 8980: Advanced Topics in Graphical Models

Instructor: Arindam Banerjee

September 4, 2007

General Information

- Course Number: CSci 8980
- Class: Tu Th 09:45-11:00 am
- Location: 156 Amundson Hall
- Instructor: Arindam Banerjee
- Office Hours: EE/CS 6-213 Tu Th 11 am 12 noon
- Web page: http://www-users.itlabs.umn.edu/classes/Fall-2007/csci8980-graph
- Email: banerjee@cs.umn.edu

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Course Work

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• Review 10 papers from the 'Papers' section

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 - Contributions need to be constructive/useful

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Course Work (Contd.)

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• Class Project: 45% of total grade

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Topics

• Warmup

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- Widely used for model-based clustering

FMM (Contd.)

• Generative Model



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FMM (Contd.)

- Generative Model
 - Sample $h \sim \alpha$

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$$(lpha^*, \Theta^*) = \operatorname{argmax}_{(lpha, \Theta)} \sum_{i=1}^n \log p(x_i | lpha, \Theta)$$

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- Inference problem: Which component z_i generated sample x_i?

Learning Mixture Models

• Estimation: Need to maximize

$$\sum_{i=1}^{n} \log \left(\sum_{h=1}^{k} \alpha_h p_h(x_i | \theta_h) \right)$$

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- Expectation Maximization (EM) is the standard approach
- Recent years have seen progress on alternative methods

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EM: The Basic Idea

• Let z_i be the latent component generating x_i

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 $E_{Z}[\log p(X, Z | \alpha, \Theta)]$