

# Using Fisher Kernels from Topic Models for Dimensionality Reduction

- Objective
  - Analyze the performance of topic models for classification
  - Combine metrics that capture different aspects of the data
- Motivation
  - Technique to compare generative models for classification
  - Use topic models
    - As feature extractors
    - To map documents to a lower dimensional space

*cse@buffalo*

# Using Fisher Kernels from Topic Models for Dimensionality Reduction

- Analyze *Latent Dirichlet Allocation* (LDA - Blei et al., JMLR 2003)

$$\frac{\partial \mathcal{L}}{\partial \alpha_i} = \Psi(\sum_{j=1}^k \alpha_j) - \Psi(\alpha_i) + \Psi(\gamma_i) - \Psi(\sum_{j=1}^k \gamma_j) \quad (1)$$

$$\frac{\partial \mathcal{L}}{\partial \beta_{ij}} = \sum_{n=1}^N \frac{\phi_{ni} w_n^j}{\beta_{ij}} \quad (2)$$

- Performance of *Fisher LDA* for text classification
  - Training and test accuracies were never less than that of LDA
  - Lower computational cost of training
  - Induced features result in classifiers with lower VC dimensions (upper bound)

*cse@buffalo*