Lab 12: LaTeX

Your Name

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Directions

Your lab assignment today is to write the code to produce this document (yes this one, the whole thing) as well as a "README.md" which mimics this. You should end up with a second copy of this document at the end, but one that you compiled using LaTeX via the `pdflatex` command.

1. First, write some "code" (hint: LaTeX is popular on stack overflow).
2. Then, compile it with `pdflatex`.
3. Check the pdf to see if it looks right.
4. Rinse, repeat.
5. When you're done, submit your `.tex` file and "README.md".

Text Formatting

Sometimes, you may want to emphasize some text.

Problem 0: Latent Dirichlet Allocation

Hey, can you help me with my homework? In Latent Dirichlet Allocation, we might need to use the equation for collapsed Gibbs sampling with equal document lengths N. (hint: math symbols can't be emphasized like text)

According to our model, the total probability is given as follows:

$$P(W, Z, \theta, \phi, \alpha, \beta) = \prod_{i=1}^{K} P(\phi_i; \beta) \prod_{j=1}^{M} P(\theta_j; \alpha) \prod_{t=1}^{N} P(Z_{j,t}|\theta_j) P(W_{j,t}|\phi_{Z_{j,t}}) \quad (1)$$

After some fancy math on (1), integrating ϕ and θ out gives us

$$P(Z, W; \alpha, \beta) = \prod_{j=1}^{M} \Gamma\left(\sum_{i=1}^{K} \alpha_i\right) \prod_{i=1}^{K} \Gamma\left(n_i^{(j,\cdot)} + \alpha_i\right) \Gamma(\alpha_i) \Gamma\left(\sum_{i=1}^{K} n_i^{(j,\cdot)} + \alpha_i\right) \times \prod_{r=1}^{K} \Gamma\left(\sum_{i=1}^{V} \beta_r\right) \prod_{i=1}^{V} \Gamma\left(n_i^{(\cdot,r)} + \beta_r\right) \quad (2)$$

Now we can work with that!

Problem 1: Let's Learn Markdown!

Make your git page's `README.md` to mimic this paper. HINT: you can embed latex equations into your markdown. You could use Pandoc, but don't because that's cheating. To keep it simple, I'd recommend turning your equations into images.