Probabilistic Programming for Voucher Information Extraction
Preliminary Practical Experiences
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Probabilistic Programming for Voucher Information Extraction

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Voucher Grouping

To provide more accurate models, to partition the voucher into groups of similar layout and style. We rely on probabilistic Latent Dirichlet Allocation (LDA) to perform the grouping, using visual (colors, lines) and textual cues (keywords).

Finding Features w/Keywords

Features are usually located around identifying keywords. Keywords can be positive or negative depending on the feature to be found.

<table>
<thead>
<tr>
<th>Total Amount Excl. VAT</th>
<th>23613.00 DKK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total VAT</td>
<td>5903.25 DKK</td>
</tr>
<tr>
<td>Total Amount</td>
<td>29516.25 DKK</td>
</tr>
</tbody>
</table>

Probabilistic model below tries to infer a latent score \( r \) from the vector of observed angles \( \theta^+ \) and distances \( d^+ \) from positive keywords to potential target features.

\[
\begin{align*}
    r & \sim \mathcal{B}(0.5,0.5) \\
    \bar{r} & = (r, 1 - r) \\
    w_1^+ & = (0.7, 0.3) \\
    \mu_1^+ & = (0, \frac{\pi}{2}) \\
    w_2^+ & = (0.5, 0.2, 0.3) \\
    \mu_2^+ & = (-\frac{\pi}{2}, \frac{\pi}{4}, \frac{3\pi}{4}) \\
    \bar{\theta}^+ | r & \sim \sum_{j=1}^{2} \bar{r}_j \sum_{i=1}^{w_j^+} \nu_M(\mu_j^+, \frac{4}{\pi}) \\
    \bar{d}^+ | r & \sim \bar{r}_1, N^+(500) + \bar{r}_2, N(1500, 1000)
\end{align*}
\]

Evaluating extended version on 1000 vouchers:

- **80%** of the time the expected score found the target feature
- **99%** of the time it was within confidence interval

Practical Experiences

**Sampling**

- Ease of use  
- Precision  
- Scalability

**Variational Inference**

- Scalability  
- Set-up  
- Precision

**GPU Support**

- Discrete Latents  
- Ease of use  
- Precision

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