Bayesian dose-response network meta-analysis

Authors: Tasnim Hamza and Georgia Salanti
Presented by: Tasnim Hamza, PhD candidate, Institute of Social and Preventive Medicine (ISPM)

Outline

1. Dose-response model within a study
2. Dose-response pairwise meta-analysis
3. Dose-response network meta-analysis (NMA)

Methods – standard NMA model

Steps 1-3
1. In a study with dose x treatment k:
   - Restricted cubic spline
   - Network meta-regression
   - Study year

Steps 4-5
4. Consistency equation
   \( d_{jk} = d_{jk} - d_{kj} \)
5. Priors
   \( u \sim N(0, 10^{-5}) \)
   \( d_{jk} \sim N(0, 10^{-5}) \)
   \( \tau \sim Unif(0, 10) \)
2.1. In a study

Dataset

Methods

Methods – dose-response NMA model

Methods – dose-response NMA model with class effect

Methods – dose-response NMA model with covariate

Dataset – antidepressants

Dataset – antidepressants (colored by class)

Dataset – splitted network
Results – dose-response NMR with class effect (M5)

Dataset – antidepressants (colored by class)

Results – comparison between the 5 models

<table>
<thead>
<tr>
<th></th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
<th>M5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau$</td>
<td>0.201</td>
<td>0.190</td>
<td>0.163</td>
<td>0.184</td>
<td>0.202</td>
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<td>1301</td>
<td>1191</td>
<td>1280</td>
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</tbody>
</table>

* $\tau$ – common heterogeneity **DIC - Deviance Information Criterion

- M1: dose-response NMA
- M2: dose-response NMR with RoB
- M3: dose-response NMR with study-year
- M4: dose-response NMR with variance
- M5: dose-response NMA with class effect
### Limitations in the approach

- **Bayesian framework**
  - Sensitivity to prior choice; sensitivity analysis
  - Time consuming
  - Ensure convergence
- **Dose-response models**
  - Categorization of the exposure
  - The dose-response shape
- **Dose-response NMA model**
  - Doses should be harmonized in class effect model