

MMNPP Simulation Code Summary

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This document provides background for the 2 simulated case studies provided. Once generation of simulated data is complete, it can be simply run through the EM calibration file, and then model outputs can be analysed either manually or using the other two provided files.

Case Study 1

This example simulates data from an order 3 MMNPP with a constant frequency perturbation/exposure measure that changes periodically over the simulated period.

The following inputs are required:

1. **trueQ**: This is the transition rate matrix for the Hidden Markov chain.
2. **trueLambda**: This is the conditional Poisson intensity.
3. **timelength**: This is the length of time for each period of constant exposure.
4. **exposure.values**: This is a vector of the frequency perturbation/exposure values (γ in the related paper).

Case Study 2

This example simulates count data from a modified order 3 MMNPP where the hidden Markov regimes are instead replaced with known regimes that periodically change. This example serves to demonstrate the regime-filtering capabilities of the proposed EM calibration algorithm, as plots of the most likely regime over time are easier to decipher in this case. The frequency perturbation/exposure measure is assumed to change periodically as well, at the same time as regime changes for convenience.

The following inputs are required:

1. **reg.order**: This is the sequential order of the “hidden” Markov regimes.
2. **exposure**: This is the sequential frequency perturbation/exposure values applicable during each of the regimes.
3. **base.freq**: This is the conditional Poisson intensity for each regime.
4. **length.periods**: This is the (time) length of each regime period.

References