Available Community Tools for Predictive Modelling

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Outline

Overview on currently available community resources

Introduction to PMM-Lab software

Introduction to openFSMR model repository
Community resources Predictive Modelling

**Microbial** growth, survival, inactivation **data**:

Scientific publications

ComBase  [http://www.combase.cc](http://www.combase.cc)

Sym’Previus  [http://www.symprevius.org](http://www.symprevius.org) (subscription)
Currently available Predictive Modelling

**Tools for model generation:**

\[ y(t) = y_0 + \mu_{\text{max}} A(t) - \frac{1}{m} \ln \left( \frac{\exp(m\mu_{\text{max}} A(t)) - 1}{\exp(m(y_{\text{max}} - y_0))} \right) \]

\[ A(t) = t + \frac{1}{v} \ln \left( \frac{\exp(-vt) + q_0}{1 + q_0} \right) \]

- **DMFit**  
  [www.ifr.ac.uk/safety/dmfit/](http://www.ifr.ac.uk/safety/dmfit/)

- **GInaFiT**  

- **IPMP**  

- **nlsMicrobio (R)**  
  [https://cran.r-project.org/web/packages/nlsMicrobio/index.html](https://cran.r-project.org/web/packages/nlsMicrobio/index.html)

- **PMM-Lab**  
  [https://sourceforge.net/projects/pmmlab](https://sourceforge.net/projects/pmmlab)

- **OptiPa**  
  [www.optipa.be](http://www.optipa.be)
Currently available community resources in the area of Predictive Modelling

**Tools for model-based predictions**

- Baseline Software Tool
- ComBase Predictor
- Dairy products safety predictor
- DMRI - predictive models for meat
- E. coli Inactivation in Fermented Meats Model
- EcSF - E. coli SafeForment
- Food Spoilage and Safety Predictor (FSSP)
- **FISHMAP**
- GroPIN
- Listeria Control Model 2012
- Listeria Meat Model
- Microbial Responses Viewer (MRV)
- MicroHibro
- MLA Refrigeration Index Calculator
- Process lethality determination spreadsheet
- Perfringens Predictor
- Praedicere
- Salmonella predictions
- Shelf Stability Predictor
- SWEETSHELF
- Sym’Previous
- Therm 2.0

[https://sourceforge.net/p/microbialmodelingexchange/wiki/Tools/](https://sourceforge.net/p/microbialmodelingexchange/wiki/Tools/)

Search engine and Repository of predictive models:
Summary

=> Plenty of data and predictive microbial models available or published in scientific literature

=> Several software tools for model-based predictions available
   (GroPIN, PMP, FSSP, Sym’Previus, MRV, ComBase Predictor …)

Current challenges:
• Integrated data management process from data to models
• Annotation of data and models (e.g. nomenclature of food matrices)
• Frequently: reimplementation of models needed
• No “information exchange” between available tools

WHY:
• NO harmonized file format for exchange of data / models
• FEW open-source software solutions
• Too many “island solutions”
PMM-Lab
"Predictive Microbial Modelling – Lab"

"Graphical programming" microbial modelling tool extending the KNIME open source data analytics platform
PMM-Lab – Features
“Integrated pre-configured database”
PMM-Lab – Features
“Model generation and statistics”
PMM-Lab – Features
“Model Import / Export”
PMM-Lab – Features
“Generic model-based predictions”
Advantages of the PMM-Lab framework

• Free, open-source, transparent

• Data management integrated (raw data, model generation process, estimated models)

• Modular, highly flexible, easy-to-extend, easy-to-reuse

• Integrated into KNIME (provides integration of „R“, MATLAB, Data mining, Report generation etc.)

• Infrastructure for community contributions available: Code repository, Wiki, File download (e.g. sample files), Ticket system

• Exchange of workflows and models -> sharing of knowledge with others
**BfR-Vision**

Community-driven, curated repositories of microbial models (Food Safety Knowledge Bases)

- Newly generated models / re-implemented models
- Model generation tools
- Data
- Model repositories

[Diagram showing data flow: Data + Model generation tools → Model repositories → Newly generated models / re-implemented models → Model Repository with GUI to search and model download → Model deployment]

Matthias Filter, SPICED Symposium, 1 – 2 June 2016, Berlin
### Selected features:

1. Search and filter models (e.g. Organism, Software etc.)
2. Download of models (if provided)
3. Extended model meta-data visible (right pane)

**https://sites.google.com/site/openfsmr/**

Matthias Filter, SPICED Symposium, 1 – 2 June 2016, Berlin
Thanks to the BfR team
Miguel de Alba Aparicio, Armin Weiser, Christian Thöns, Alexander Falenski, Taras Günther, Lars Valentin, Guido Correia Carreira, Carolina Plaza-Rodriguez, Annemarie Käsbohrer, Bernd Appel

Thank you for your attention
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