Machine-Assisted Extraction of Formal Semantics from Domain Specific Semi-Formal Diagrams

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Abstract

Please keep your abstract short, fifteen lines or less. Remember that the MWS conference is attended by people from many academic disciplines, as well as colleagues in government, industry, foundations and nonprofits, and the defense and intelligence communities. So strive to make your abstract accessible.

1 Introduction

Significance

2 Related Work

2.1 Generating Formal Meaning from Informal Diagrams

3 AMIDOL

3.1 Visual Domain Specific Languages

3.2 Intermediate Representation

State and reward variables

Events

Input and output predicates

3.3 Inference Engine

4 Compartmental Model for Epidemiology

4.1 SIRS Model

H1N1 R_0 importance [3].

Ebola R_0 importance [2]

CDC Data [1]

(a) Example of a semi-formal diagram of Meoisis. CC-BY-SA 3.0 Marek Kultys, July 2, 2008.

(b) Example of a semi-formal diagram of the molecular model of the Tat transactivation circuit.
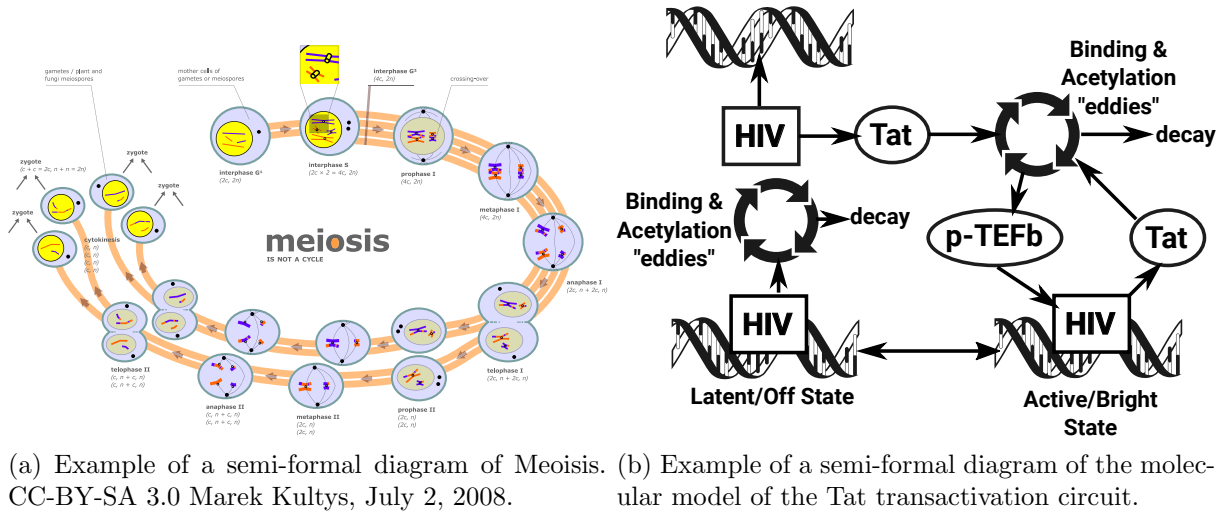
Figure 1: Examples of semi-formal diagrams drawn by domain experts to represent operational semantics and complex system models.

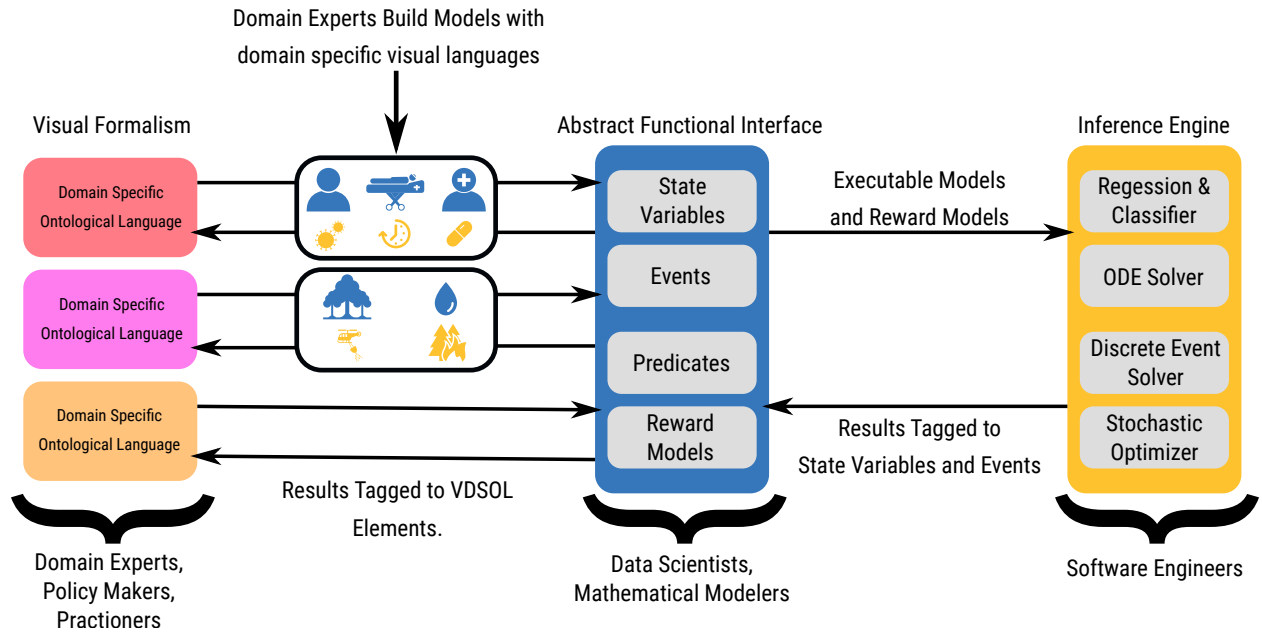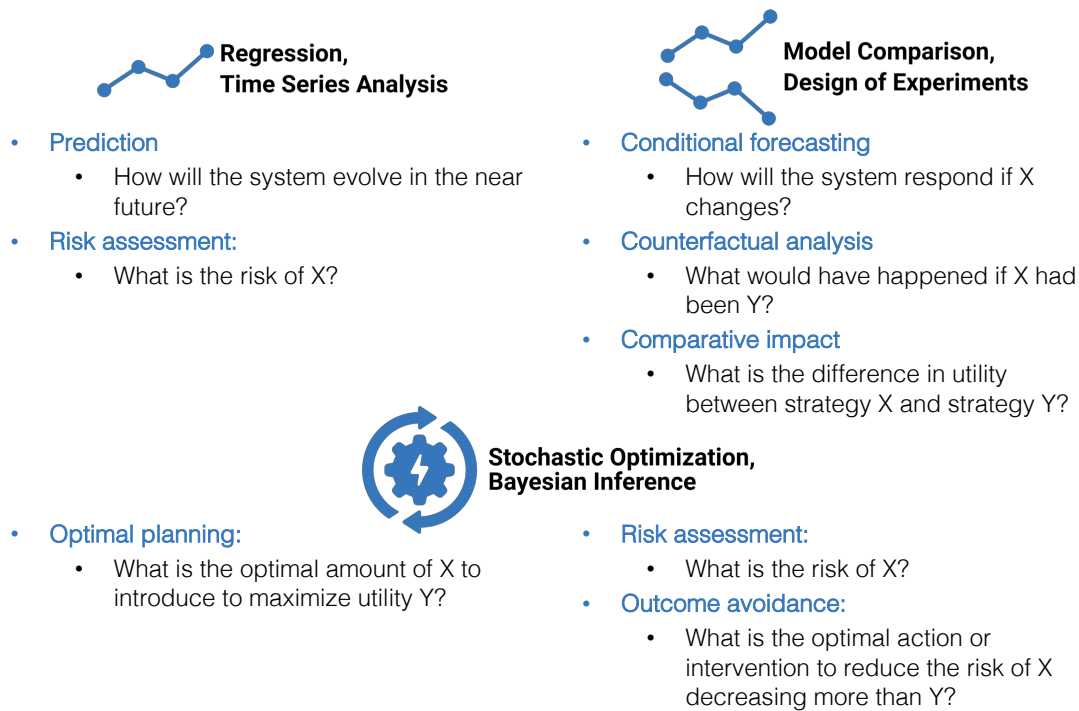Figure 2: AMIDOL Architecture

**Regression,
Time Series Analysis**

- Prediction
  - How will the system evolve in the near future?
- Risk assessment:
  - What is the risk of X?

**Model Comparison,
Design of Experiments**

- Conditional forecasting
  - How will the system respond if X changes?
- Counterfactual analysis
  - What would have happened if X had been Y?
- Comparative impact
  - What is the difference in utility between strategy X and strategy Y?

**Stochastic Optimization,
Bayesian Inference**

- Optimal planning:
  - What is the optimal amount of X to introduce to maximize utility Y?
- Risk assessment:
  - What is the risk of X?
- Outcome avoidance:
  - What is the optimal action or intervention to reduce the risk of X decreasing more than Y?

Figure 3

4.2 Vital Dynamics

5 Conclusions

6 Future Work

7 Acknowledgments

8 Resources, web sites, etc.

MWS seeks to build a community and share resources, so feel free to have a section in your paper that points readers to web sites, github pages, etc.

References

[1] CDC. National, regional, and state level outpatient illness and viral surveillance. https://www.cdc.gov/flu/weekly/fluactivitysurv.htm. Accessed: January 2019.

[2] David Fisman, Edwin Khoo, and Ashleigh Tuite. Early epidemic dynamics of the west african 2014 ebola outbreak: estimates derived with a simple two-parameter model. *PLoS currents*, 6, 2014.

[3] Christophe Fraser, Christl A Donnelly, Simon Cauchemez, William P Hanage, Maria D Van Kerkhove, T Déirdre Hollingsworth, Jamie Griffin, Rebecca F Baggaley, Helen E Jenkins, Emily J Lyons, et al. Pandemic potential of a strain of influenza a (h1n1): early findings. *science*, 2009.