Platforms
for
Agent-Based
Computational Economics

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Types of Resources

- **Standalone systems (high level)**
  - **Agents: AgentSheets, NetLogo**
  - **Mathematical: MatLab, Mathematica**
- **Software *frameworks***
  - **Java: Ascape, MASON, RePast**
  - **Objective C: Swarm**
- **Programming languages**
  - **C/C++**
  - **Java**

Code words

- **Speed of execution:**
  - **Interpreted** => **slow**
  - **Compiled** => **faster**
- **Java: object-oriented language**
  - **Signifies multi-platform capability (Windows, Mac, Unix/Linux, other)**
  - **signifies free availability**
- **Cost: *nominal*: < $100; *moderate*: <$1000; else *expensive***

AgentSheets

- *Simplest* agent modeling system
- <u>Programming</u>: it's own visual language, interpreted
- <u>Main use</u>: educational tool, including kids
- <u>Availability</u>: multi-platform, Java compiler (applets), nominal cost

NetLogo

- *Simplest* agent modeling system useful to researchers
- <u>Programming</u>: it's own **object-oriented** agent language, **interpreted**, new 3D visuals
- <u>Main use</u>: education + research
- <u>Availability</u>: **multi-platform**, written in Java, **applets**, **free**

MatLab

- **Highly capable numerical analysis engine and modeling system**
- <u>**Programming**</u>**: it's own language, object-oriented extensions, compiled**
- <u>**Main use**</u>**: scientists and engineers; can be used for agent models**
- <u>**Availability**</u>**: multi-platform, moderate cost, need MatLab engine to run, good support, large user group**

Mathematica

- **Canonical system for doing symbolic mathematics**
- **<u>Programming</u>: it's own interpreted language, partially compiled; weak object-oriented extensions; compact**
- **<u>Main use</u>: scientists and engineers; sometimes used for agent models**
- **<u>Availability</u>: multi-platform, expensive, need *Mathematica* to run**

Swarm

- **Early agent modeling system, written by C. Langton at Santa Fe**
- **<u>Programming</u>: Objective C (semi-archaic); difficult to install; Unix/Linux only**
- **<u>Main use</u>: many early agent models**
- **<u>Availability</u>: free, open source at Swarm.org**

Ascape

- **First agent modeling *framework* aimed at social scientists**
- **Programming: Java**
- **Main use: *Spatial* social science models (e.g., Sugarscape, Anasazi)**
- **Availability: multi-platform, applets, version 1.9 free, open source; version 3.0 commercial**

RePast->SimPhony

- **Agent modeling platform targeted at social scientists**
- **<u>Programming</u>: Java and .Net C# -> visual language; new extensions to GIS systems (GRASS)**
- **<u>Main use</u>: social science**
- **<u>Availability</u>: multi-platforms, applets, free, open source, large user group, good support**

MASON

- **Next generation agent modeling system for social scientists and others**

- **<u>Programming</u>: Java**

- **<u>Main use</u>: social and computer science; separates simulation engine, visualization and analysis**

- **<u>Availability</u>: multi-platform, applets, free and open source, good support**

Java

- **Canonical object-oriented multi-platform programming environment**
- **<u>Programming</u>: compiled to machine independent form, pretty fast; social scientists need 1 course to do it well**
- **<u>Main use</u>: widely used in all fields**
- **<u>Availability</u>: multi-platform, applets, free, including many good IDEs**

C/C++

- Canonical **object-oriented** programming environment
- <u>Programming</u>: **compiled** to machine specific form, *fastest execution time*; social scientists need 1 course to do it safely, often 1 more to do it well
- <u>Main use</u>: widely used in all fields
- <u>Availability</u>: code can be **multi-platform**, binaries not multi-platform, free to expensive

Summary

Performance

Programming 'maturity'/experience

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AgentSheets
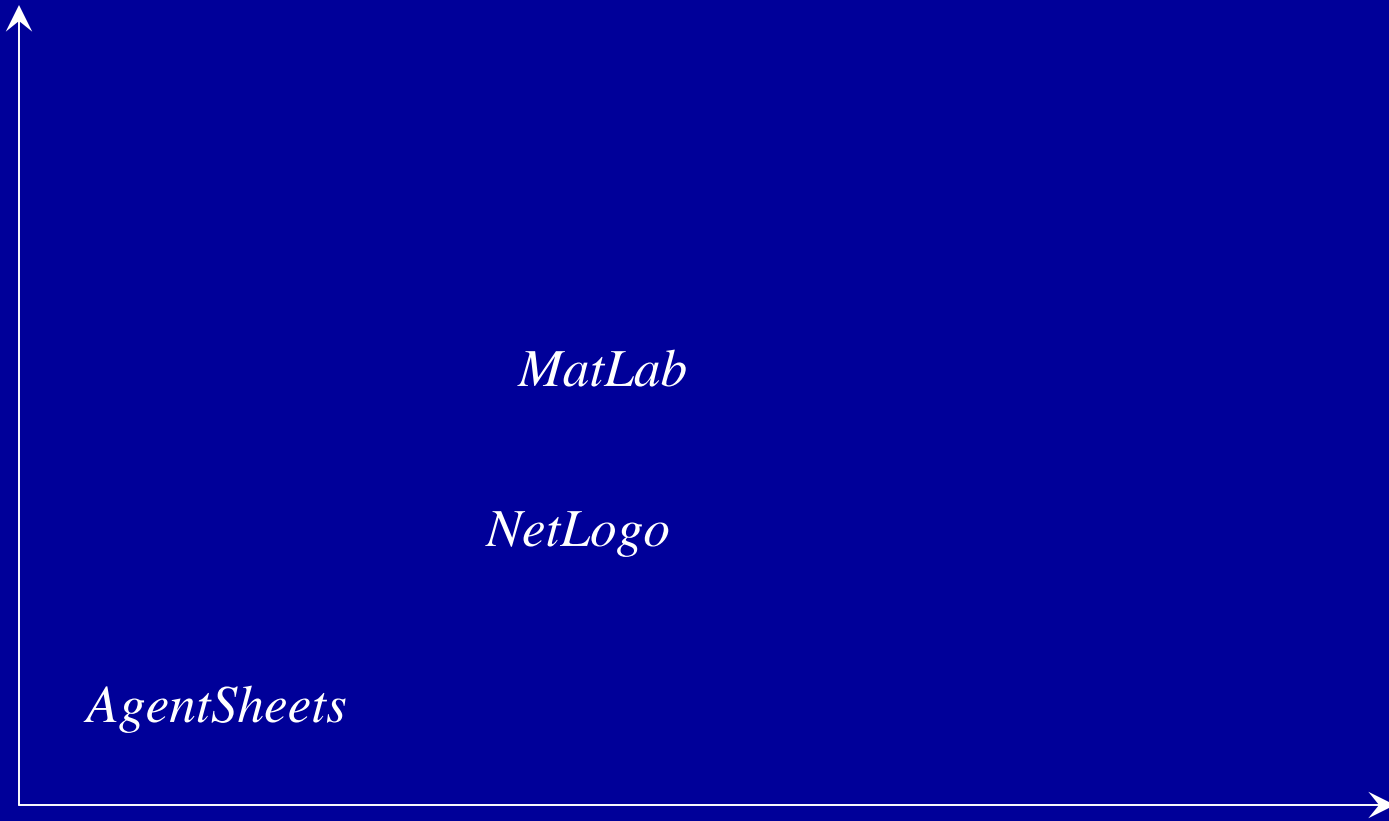
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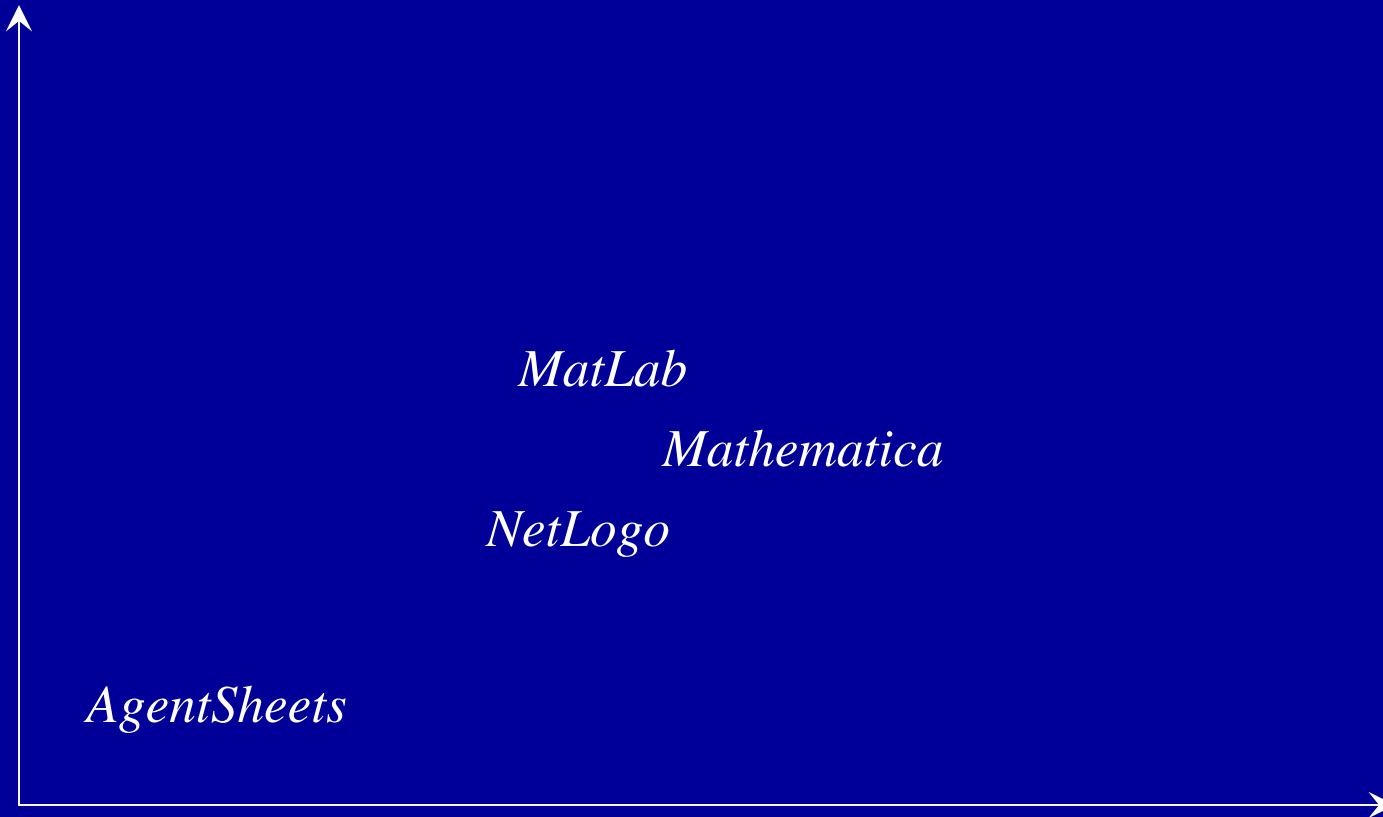AgentSheets

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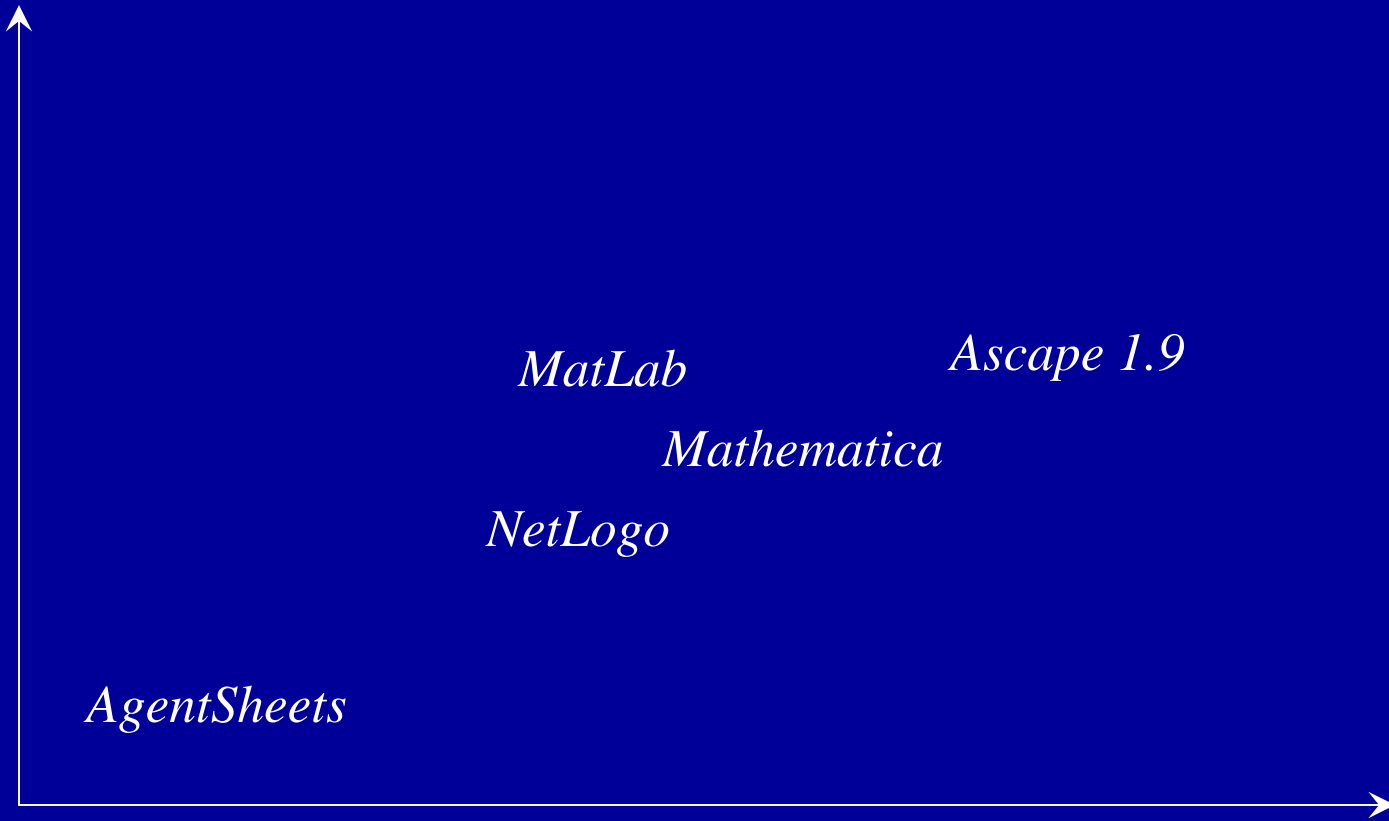
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