Agent-based social simulation tools: Brahms and NetLogo

Rory Sie, LN plenary

September 21st, 2010
Structure

* Agent-based social simulation tools... what?
* Brahms
* NetLogo
* Brahms vs. NetLogo (yeah!)
What are agent-based social simulation tools?

- Agent-based computing
- Computer simulation
- Social science
- Tools

stolen from Davidsson (2002)
Brahms in a nutshell

- Developed by NASA
- Primarily used for work practice modelling
- Agent-oriented simulation
- Allows for cognitive modelling (Belief-Desire-Intention model)
Brahms in a nutshell

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Brahms in a nutshell

* Developed by NASA

* Primarily used for work practice modelling, social science

* Agent-oriented simulation, agent-based simulation

* Allows for cognitive modelling (Belief-Desire-Intention model)
Basic use

- Facts
- **Beliefs** about facts
- Activities
- Workframes
- Thoughtframes
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this is a presentation

I think this is a presentation
Basic use

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this is a presentation

I think this is a presentation

give a presentation
Basic use

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this is a presentation
I think this is a presentation
give a presentation
if LN plenary then give a presentation
Basic use

• Facts       this is a presentation
• **Beliefs** about facts  I think this is a presentation
• Activities  give a presentation
• Workframes  if LN plenary then give a presentation
• Thoughtframes  if LN plenary is now, I think LN plenary is now
Programming example (1/2)

* activities:

```javascript
primitive_activity GivePresentation(){
  display: "Giving a presentation";
  min_duration:1; // one second
  max_duration:1800; // 1800 seconds, or half an hour
}
```
workframe wf_GivePresentation{
  repeat: false;
  variables:
  forone(boolean) LN_plenaryIsNow; // belief
  when(knownval(current.LN_PlenaryIsNow = true)) // if LN plenary is now
  do{ // then
    GivePresentation(); // give the presentation
    conclude((current.givingPresentation = true), bc:100, fc:100); // new belief/fact
  }
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workframe wf_GivePresentation{

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that's me!

belief

fact
Brahms agent viewer

Timeline View

- Date: 09/20/2010
- Time: 09:50:42 AM

Agent: Rory

Event: wf_GivePresentation

Action: Giving a presentation

Duration: 1800
Brahms strong points

- Agent reasoning
- Very realistic and powerful
  - Communication protocol
- Agents/objects can carry (conceptual) objects
- Locations
Brahms weak points

- Relatively small group of users (NASA, TU Delft)
- Difficult to model iterations
- Little support for transient / fuzzy relationships
- Difficult to model randomness
NetLogo in a nutshell

- Developed by Uri Wilensky in 1999
- Swarm-based simulation
- Micro-level programming --> study macro-level behaviour
- New version released!
Runtime Example
NetLogo strong points

- Lots of users
- Iterations, randomness
- Support for media
- Easy to use
### Brahms vs. NetLogo

<table>
<thead>
<tr>
<th>Feature</th>
<th>Brahms</th>
<th>NetLogo</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>agent-oriented</td>
<td>swarm-based</td>
</tr>
<tr>
<td>primary goal</td>
<td>work-practice</td>
<td>social simulation</td>
</tr>
<tr>
<td>no. users</td>
<td>-</td>
<td>++</td>
</tr>
<tr>
<td>support</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>usability</td>
<td>+/-</td>
<td>++</td>
</tr>
<tr>
<td>agent reasoning</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>math operations</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>include media</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

*di 21 sep 10 (wk)*
What suits you best?

- My point of view

- Interested? → rse@ou.nl
What suits you best?

- My point of view
- Interested? → rse@ou.nl