Micro-debates for Policy-Making - *CompSust12*

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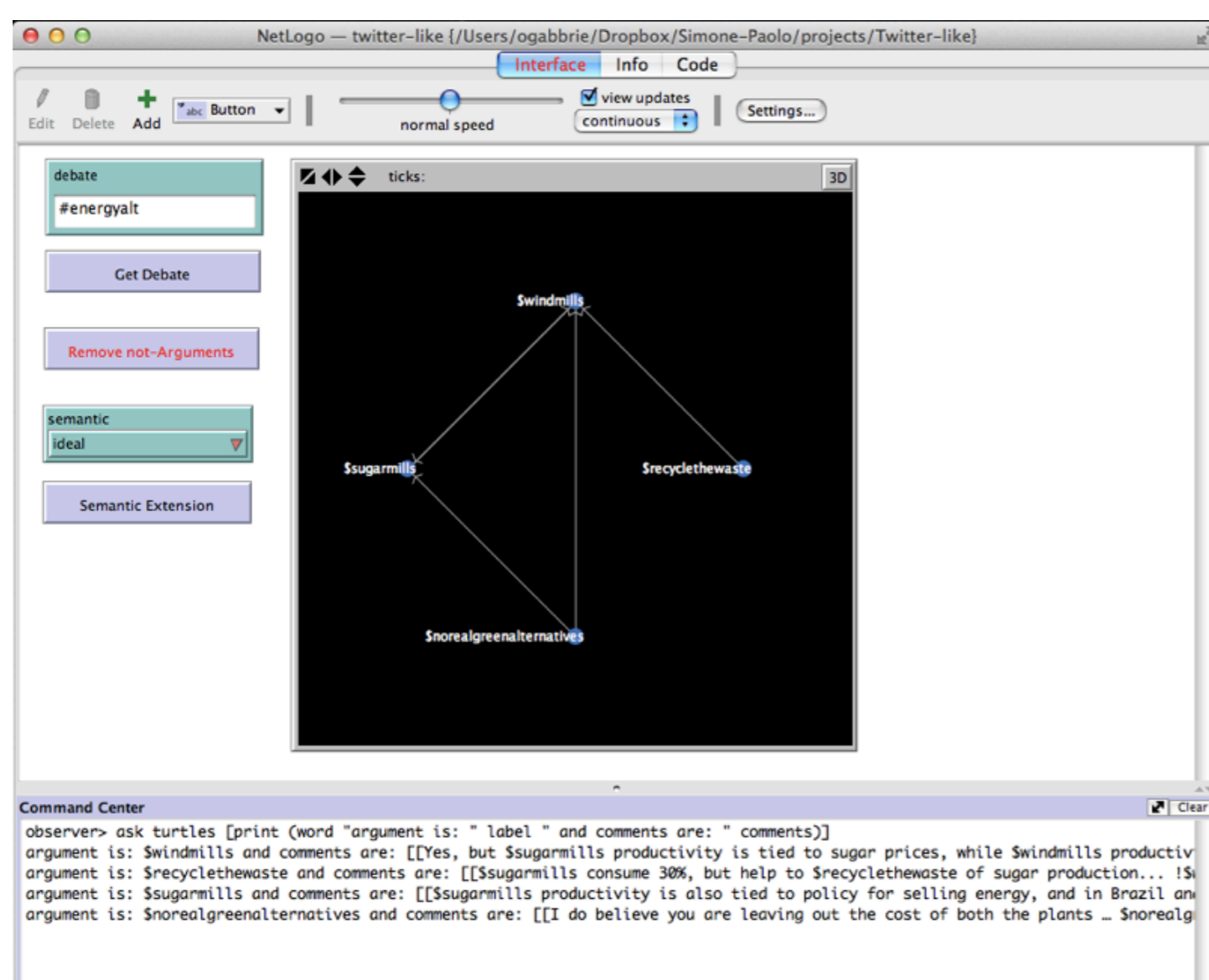
Introduction

- Web 2.0 platforms have become a mass phenomenon whereby billions of individuals consume and share resources. Administrations and policy-makers are more and more interested in using the Internet, and in particular the social Web, as an e-participation tool. Web 2.0 platforms allow for **online debates** between (informed) citizens, where they are free to exchange unconstrained opinions and critiques about certain topics.
- It becomes very expensive for policy-makers to make sense of opinions emerging from online debates. Opinion mining/sentiment analysis techniques and tools look at sentiment orientation of opinions in terms of values in a positive/negative scale. Classification **accuracy** is quite good in some domains, e.g., customer reviews, but... it is not (yet) as good in political debates, and, above all, it does not explicitly tell **why** certain opinions are in place and how they relate to other opinions.
- **Our work goes in the perspective of encouraging free, unconstrained online debate, as a tool in the hands of the citizens, who can use it to voice their opinions, and convey them to the policy-makers:**
  - identify **specific opinions** used in a discussion
  - identify the **argument structure** that is tied to such opinions (if any)
  - identify the **relations amongst arguments**
- The Argumentative Theory of Reasoning (Mercier, & Sperber) tells us that people are good at reasoning when they communicate through an argumentative context
- When debating about policy issues, we thus expect that users will not only publish their opinion (like in a review setting), but also:
  - try to convince others by producing arguments;
  - rebut (attack) each others' arguments.
- We identify **computational argumentation**, and in particular **abstract argumentation**, as the conceptual and computational framework to model arguments and reason from them automatically..
- Dung's approach to argumentation framework:
  - a set of atomic arguments, X
  - a binary attacks relation over arguments, $A \subseteq X \times X$, with $\langle x , y \rangle \in A$ interpreted as "the argument x attacks the argument y".
  - collections of justified arguments described by extension-based semantics
- Toni & Torroni proposal:
  - enhancing online debate platform, allowing users to specify elements of argumentation framework within ongoing debate (sample platform: facebook)
- Our proposal is to develop an application based on a Twitter dialect that allows users to discuss about topics, aided (in the back-end) by computational argumentation.
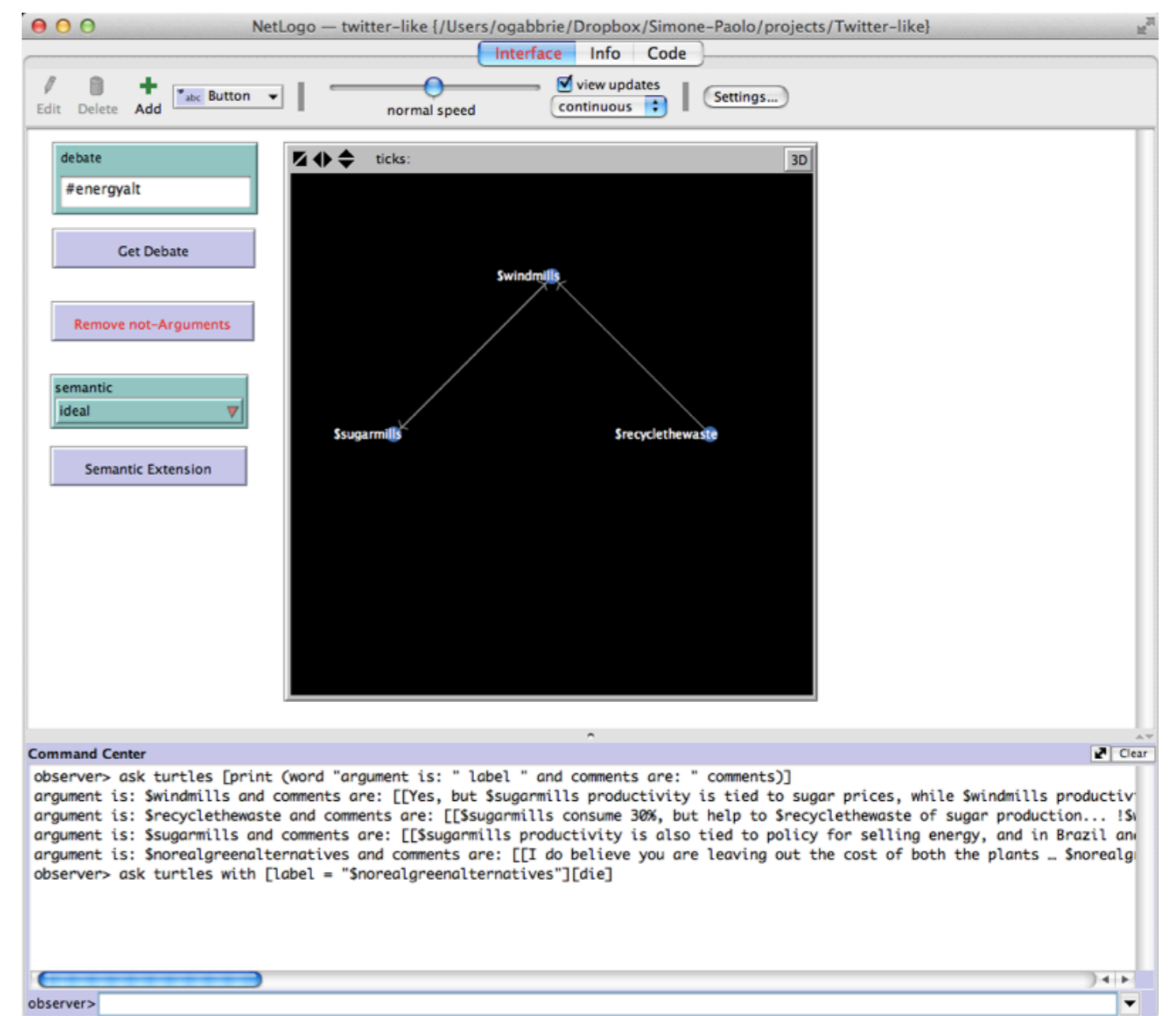- We therefore introduce the concept of **micro-debates**

Micro-debates

- a **micro-debate** is a stream of tweets where users annotate their messages by using some special tags:
  - # tag identifies a specific micro-debate (name)
  - $ tag identifies one or more assertions they support
  - !$ tag identifies one or more assertions they oppose
- thus a micro-debate tweet will look like:
  - tweet := comment #debateName <$opinionA, ..., $opinionM> <!$opinionB, ..., !$opinionN>
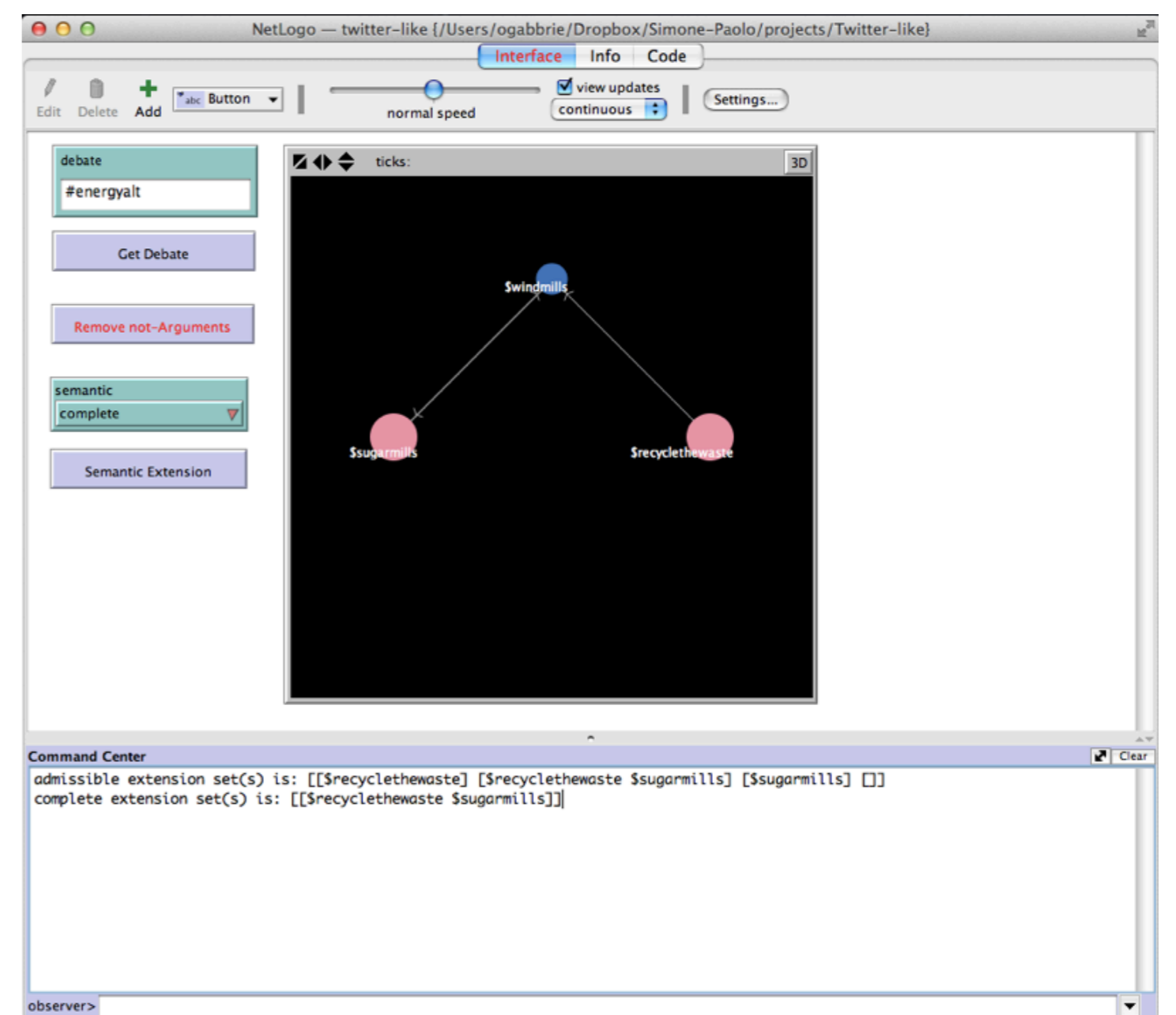- We have developed an agent-based model in NetLogo and a NetLogo extension to automate parsing

- As a first step, we extract and parse the stream of tweets in a selected micro-debate so that:
  - for each $opinionName tag, an argument is created;
  - for each !$opinionName tag, an attack link is created toward the named opinion
  - each argument stores all the comments that refer to that argument in the micro-debate
- **Naive AF**: we consider every assertion to be an argument and include it in the argumentation framework

- **Smart AF**: we then propose **argument classification** as a way to verify if each node is a well-formed argument or not:
  - If, based on its comments, a node proves to be a well-formed argument, we keep it in the AF;
  - if, based in its comments, a node prove **not** to be a well-formed argument, we exclude it from the AF.

- finally, we compute semantic extensions (i.e., we find coherent group of arguments based on some criterion) on the **smart AF**, in order to visualise possible results of the discussion, thus helping policy-makers and citizens better understand what is going on in the discussion

Conclusions:

- All the tools needed are partially implemented.
- Still missing:
  - argument classification to filter arguments and keep well-formed arguments only
  - experimental evaluation to test the effectiveness of this approach in a real-world setting.
- **CON:** work in progress
  - the tool is only partially developed (argument classifier still under develop.)
  - using our syntax, Twitter users may develop habits that could be different from what we expect, leading to unforeseen system behaviour
- **CON:** needs active engagement from users
- **CON:** high-risk action: many innovations required together
- **PRO:** allows deep analysis of arguers' position in a debate
- **PRO:** technology may be useful in many other domains:
  - it uses a multidisciplinary approach
  - valuable outcome of e-Policy project
- **PRO:** no need to manually analyse documents:
  - posts are annotated by users (a form of "crowdsourcing": less qualified labor needed)
  - argument classification is automated (eliminates important bottle-neck)
- **PRO:** exploits wisdom of crowds (bottom-up argumentation), and as opposed to polls:
  - arguments arise bottom-up from the debate, it is not necessary that a single user expresses the argument entirely; many users can contribute
  - open approach (analysis dynamically visible to all users)

Further readings

- Bench Capon & Dunne, "Argumentation in artificial intelligence", *AIJ* 171 (2007) 619–64
- Dung, "On the Acceptability of Arguments and its Fundamental Role in Non-monotonic Reasoning, Logic Programming and n-Person Games", *Artificial Intelligence* (1995) 77(2): 321-358
- Mercier & Sperber, "Why do humans reason? Arguments for an argumentative theory", *Behavioral and brain sciences* (2011) 34
- Toni & Torroni, "Bottom-up argumentation", *Proc. TAFA-11 LNAI 7132*, (2012) 249-262