

## Carmen: An open source project for probabilistic graphical models

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### 1 Main topics

Tool for edition and inference in PGMs (Bayesian networks and Influence diagrams)

Software engineering methods for design, coding and testing.

Easy to maintain

Documentation: user manual, HTML pages and technical docs.  
 Simple design with emphasis in extensibility using design patterns.  
 Minimize errors via systematic tests.

Configuration management (version control) with Subversion

### 4 Comparison with other tools

	BNT	PNL	OBP	JavaBayes	BNJ	Riso	BayesLine	Weka	Elvira	Carmen
Language	Matlab	C++	Python	Java	Java	Java	Java	Java	Java	Java
License	GPL	IOSL	GPL	GPL	GPL	GPL	LGPL	GPL		LGPL
User manuals	yes	no	yes	yes	yes	yes	no	yes	yes	yes
Users list/forum	yes	no	yes	no	yes	yes	yes	yes	yes	yes
Developer manuals	no	no	no	no	no	no	no	yes	yes	yes
Developers list	yes	no	yes	no	yes	yes	yes	yes	yes	yes
Source HTML docs	no	no	no	yes	no	yes	yes	yes	yes	yes
Version control	no	no	yes	no	yes	yes	yes	yes	yes	yes
Bug tracker	no	no	yes	yes	yes	yes	yes	yes	no	yes
Start	1999	2003	2006	1996	2004	2000	2003	1993	1997	2004
Stopped	2007	2005	2007	2001	2004	2004	2003	-	-	-

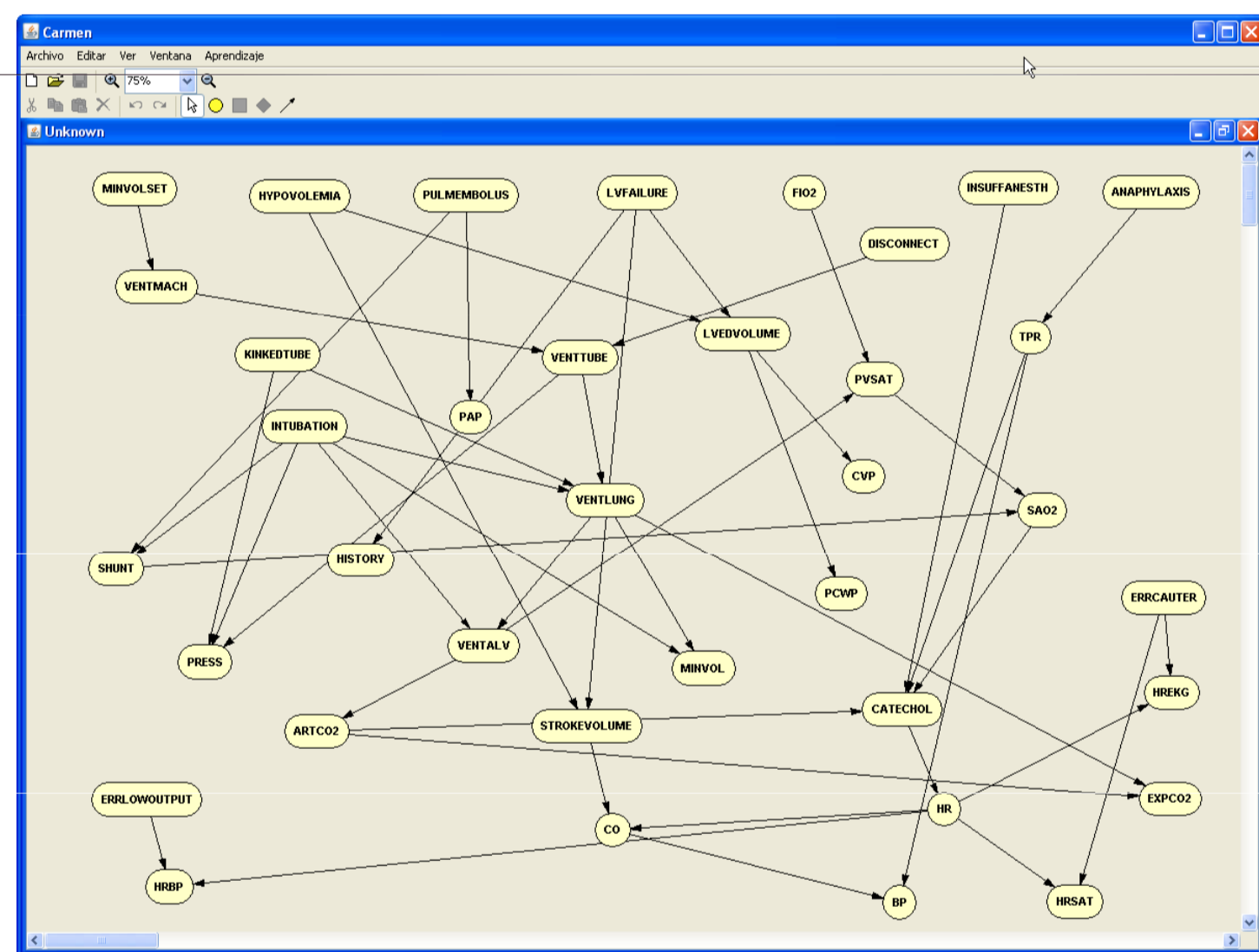
### 2 Main topics

<http://62.204.199.21/carmen>

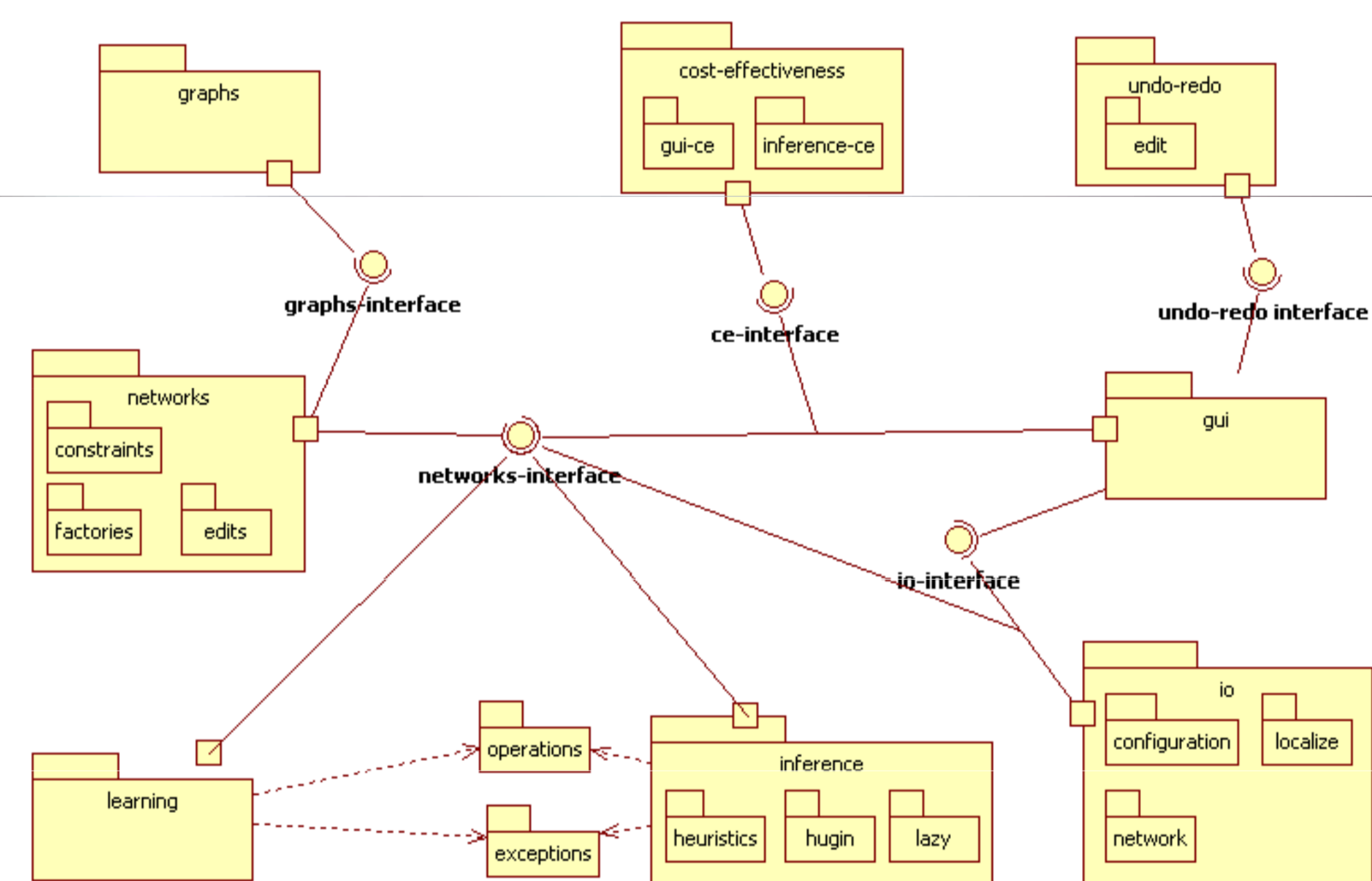
Java

LGPL license

GUI: Similar to Elvira



### 5 Carmen architecture



### 3

**Bayesian networks**

- Variable elimination
- Lazy propagation
- Hugin propagation

**Influence diagrams:** Variable elimination

**Learning:** Hill Climber with several metrics

### 6 Carmen design

- New design pattern for undo-redo operations in two phases
- New way to define a probabilistic network with a set of constraints

#### Carmen codification

- Programming style: extensión of Sun standar for Java

#### Carmen tests

- Test classes with Junit
- Structure of classes mimic architectural packages

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