Visual Logic

A Graphical System For Logical Reasoning Using Existential Graphs

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Formal Logic

- Formal Logic is an effective tool for reasoning
- Used in many fields such as Computer Science, Philosophy, Mathematics
- Abstract, has a tough learning curve, and difficult to interpret

Formal Logic Expressions:

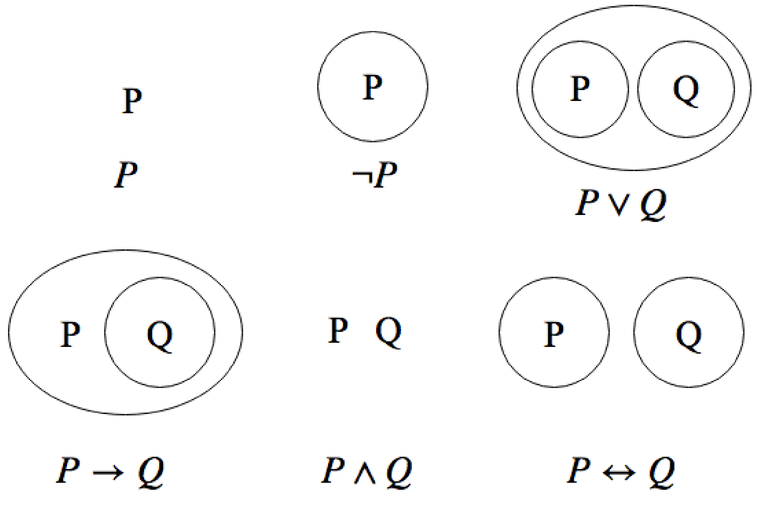
$\neg P$	P does not exist (or is false)
P	P exists (or is true)
$P \wedge Q$	P and Q exists
$P \vee Q$	P or (and) Q
$P \rightarrow Q$	If P, then Q exists
$P \leftrightarrow Q$	P exists if and only if Q

…and many more!

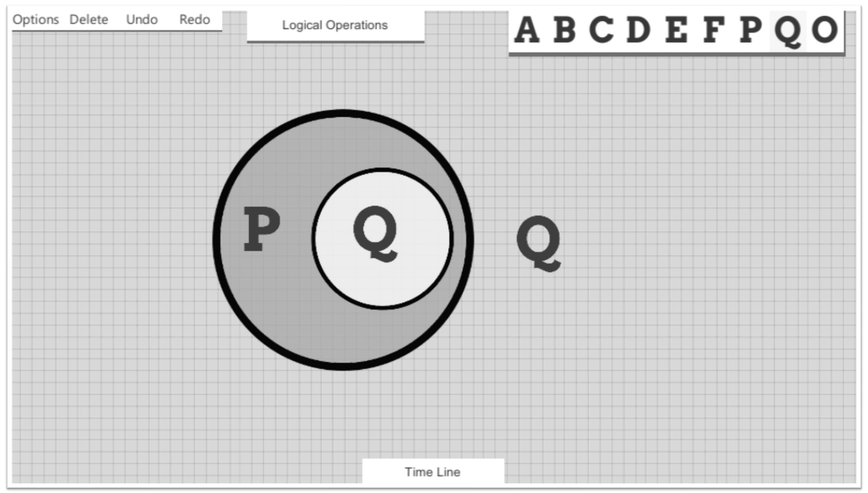
- Many operations combined with unintuitive steps leads to difficulty creating even simple proofs for beginners

Existential Graphs

- Developed by Charles Sanders Peirce as a purely visual logical system
- Alternating layers indicate true or false, only four operations
- All actions are done by adding or removing elements

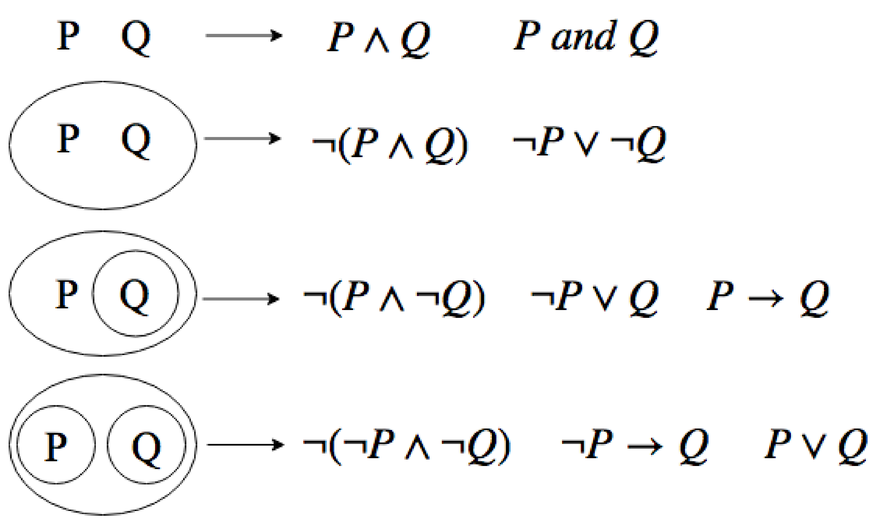


Interface & Features



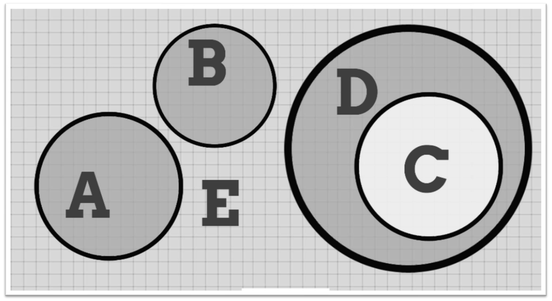
- Workspace where cuts and symbols can be manipulated freely
- Manipulate graphs to create proofs, no need to rewrite statements
- No sub-proofs needed!
- Expression completeness
- Create formal proofs just like in traditional formal logic

Existential Graphs represent multiple statements at once:



Advantages

- Express more information with less symbols
- Proofs often require less steps and have fewer rules
- More engaging process
- Restricted to four operations compared to ten to twenty in traditional formal logic
- Sandbox to experiment and learn logic



Future Work

- Displaying proofs as “movies”
- Automated theorem proving
- Timeline of steps taken
- Empirical data on using existential graphs vs traditional logic
- Higher levels of logic, first order, modal…

Demo & Other information

Online Version available at:
http://shailpatels.me/vl_web/vlDemo.html
GitHub:
https://github.com/shailpatels/VisualLogic
Professor van Heuveln’s research:
http://www.cogsci.rpi.edu/~heuveb/Research/EG/index.html
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