AVER: Argument Visualization for Evidential Reasoning

Susan van den Braak and Gerard Vreeswijk

Department of Information and Computing Sciences
Utrecht University,
The Netherlands

December 8, 2006

Overview

1. Context
   - Goal
   - Contribution
   - Current state of affairs
2. Description
   - Interface
   - Structure
   - Novel features
3. Future work

Goals

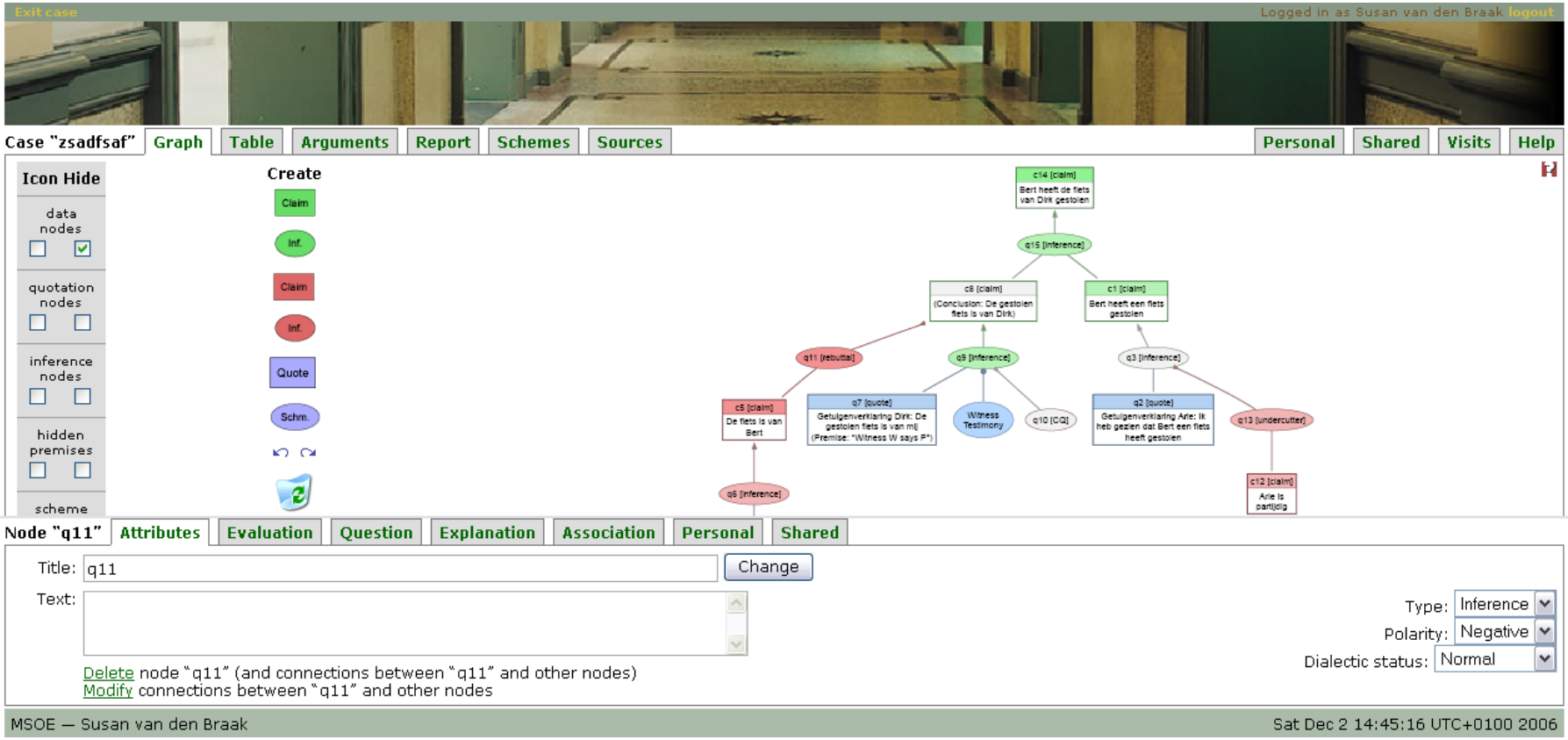
- To develop and implement a software support system for crime investigations that allows investigators to express their reasoning about a case based on evidence
  1. Construct and visualize arguments
  2. Interpret, relate, and explain evidence

Contribution

1. Argumentation schemes
2. Dialectical status assignment
3. Links between nodes and source documents

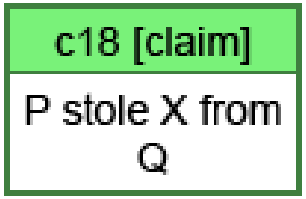
Current tool

- A prototype of a generic, domain independent, web-based system for collaboratively constructing and visualizing arguments that may be used by crime investigators to structure their reasoning about evidence.


Exit case
Logged in as Susan van den Braak logout
Case "zsadfsaf"
Graph
Table
Arguments
Report
Schemes
Sources
Personal
Shared
Visits
Help
Icon Hide
data nodes
quotation nodes
inference nodes
hidden premises
scheme
Create
Claim
Inf.
Claim
Inf.
Quote
Schm.
c14 [claim]
Bert heeft de fiets van Dirk gestolen
q15 [inference]
c8 [claim]
(Conclusion: De gestolen fiets is van Dirk)
c1 [claim]
Bert heeft een fiets gestolen
q11 [rebuttal]
q9 [inference]
q3 [inference]
c5 [claim]
De fiets is van Bert
q7 [quote]
Getuigenverklaring Dirk: De gestolen fiets is van mij (Premise: "Witness W says P")
Witness Testimony
q10 [CQ]
q2 [quote]
Getuigenverklaring Arie: Ik heb gezien dat Bert een fiets heeft gestolen
q13 [undercutter]
q6 [inference]
c12 [claim]
Arie is partijdig
Node "q11"
Attributes
Evaluation
Question
Explanation
Association
Personal
Shared
Title:
q11
Change
Text:
Delete node "q11" (and connections between "q11" and other nodes)
Modify connections between "q11" and other nodes
Type:
Inference
Polarity:
Negative
Dialectic status:
Normal
MSOE — Susan van den Braak
Sat Dec 2 14:45:16 UTC+0100 2006

Elements
Node types

- Data nodes

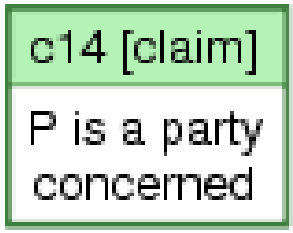


- Inference nodes

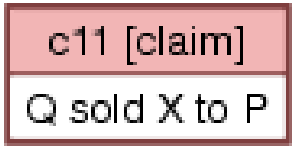
- Scheme nodes

Elements
Data nodes

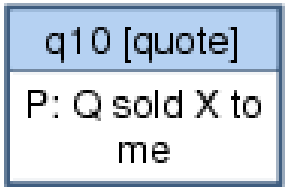
1. Interpretation nodes
   - PRO the main claim



   - CON the main claim



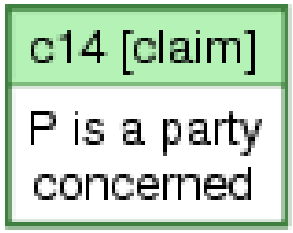
2. Quotation nodes
   - Neutral



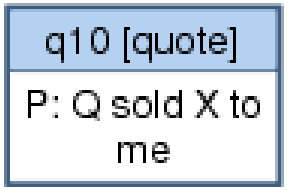
Elements

Interpretation vs. quotation nodes

- Interpretation nodes represent claims about a case

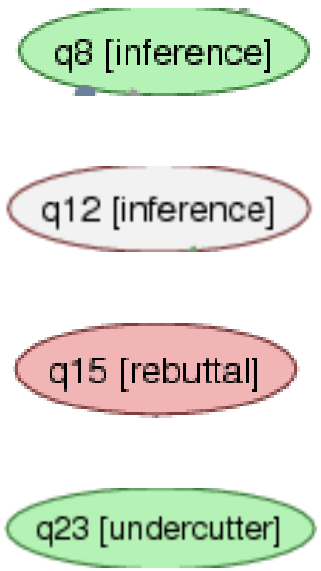


- Quotation nodes represent uncontestable information from outside the system (testimonies, reports)



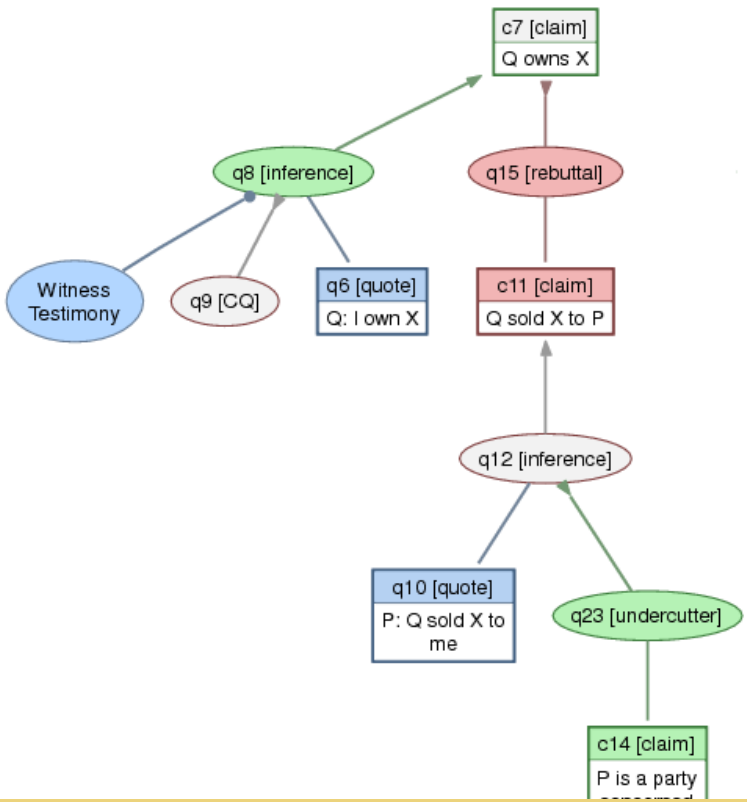
Elements
Inference nodes

- Inference nodes represent links between nodes and justifications for those connections



Elements
Inference nodes

- The polarities of the nodes that are connected determine the node type (support or attack)
  1. Inference
  2. Undercutter
  3. Rebuttal

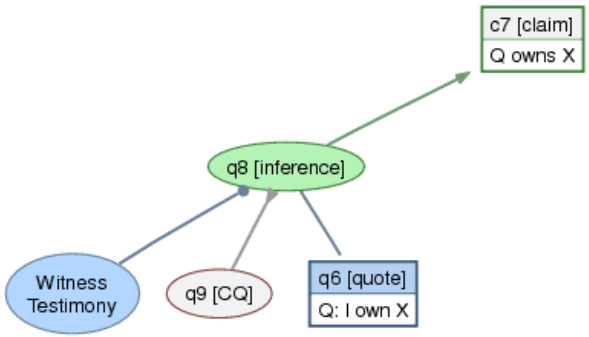


Elements
Scheme nodes

- Scheme nodes represent uncontestable schemes of inference and justifications for inference nodes

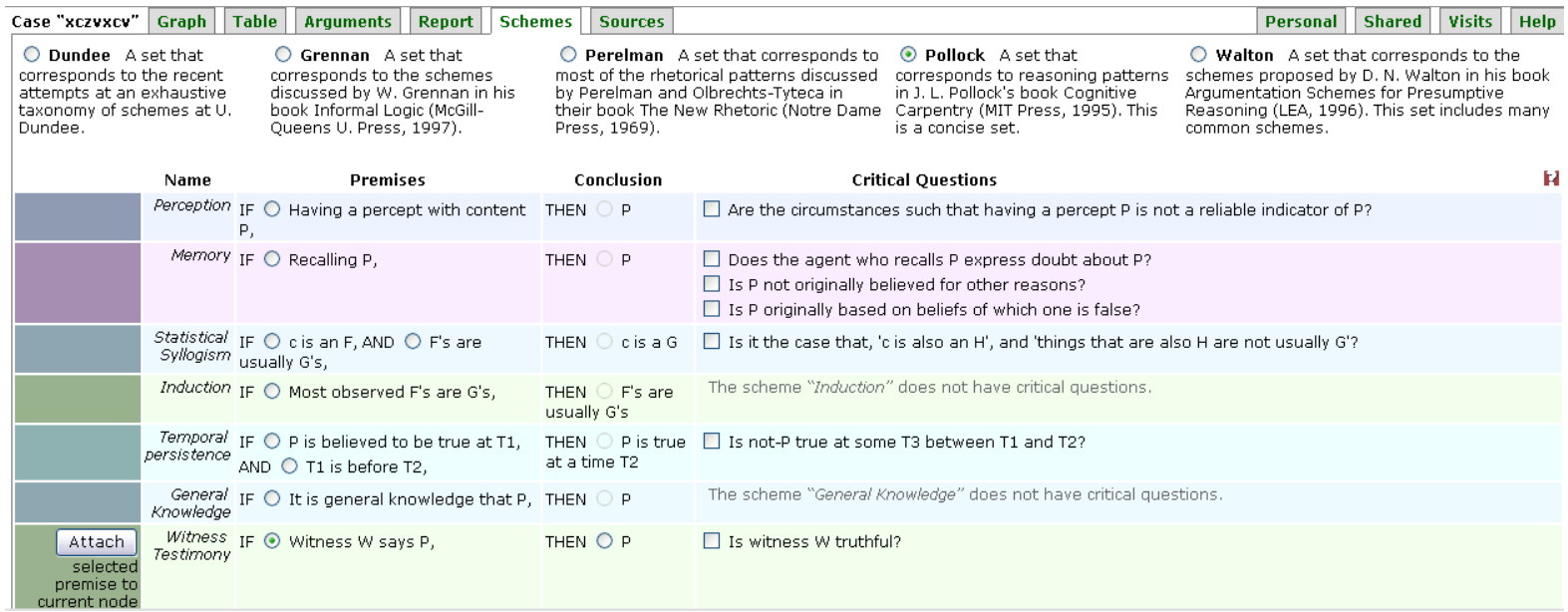
Elements
Schemes

- Represent predefined patterns of reasoning
  1. An inference
  2. Prerequisites for the inference
  3. Critical questions



Features
Scheme instantiation

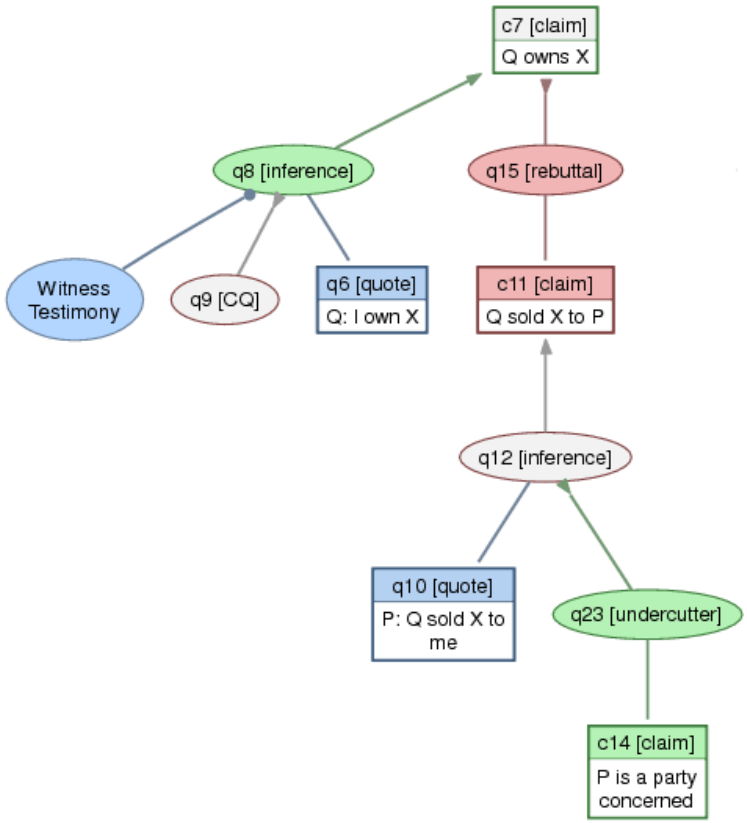
- Expands existing data nodes by scheme instantiation
- Adds critical questions as latent undercutters



Features

Evaluation of the status of nodes

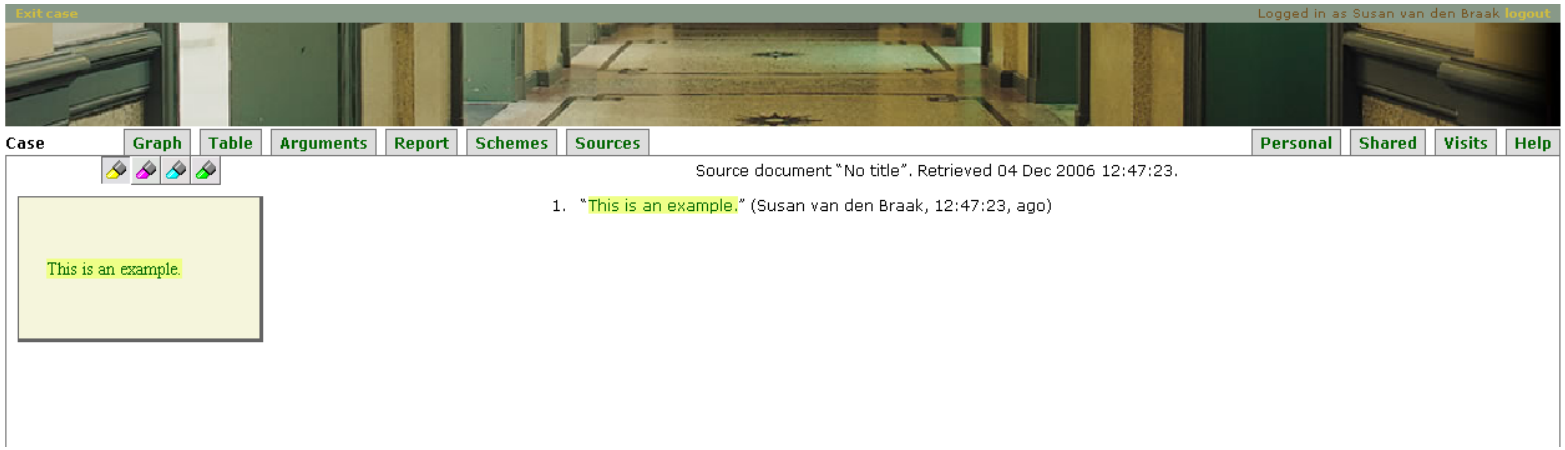
- Evaluate the status of the nodes based on their inferential connections



Features

Connection with original source files

- Adds new quotation nodes to the graph by text selection



Future work

- Extensions
  - Crime-related schemes
  - Functionality to represent stories and to relate stories to arguments
- Testing
  - Usability
  - Effectiveness