Block 5: Argument mining

Argument Mining

"The automatic identification and extraction of the structure of inference and reasoning expressed as arguments presented in natural language."

(J. Lawrence and C. Reed, 2020)

Argument Mining

<u>Focus on:</u>

"Developing methods to process textual data and reconstruct argumentative content, specifically, extracting arguments along with their relations from natural language texts to the end of providing machine-processable structured data that can be used by computational models."

(E. Cabrio and S. Vilata, 2018)

Argumentation in Natural Language

Challenges:

-Logic of natural language is intractable

-Natural language often carries a lot of implicit information

-Not all natural language arguments are well formed or sound

-Many competing notions of argument strength, quality and soundness

Argument Extraction

-<u>Component classification:</u> Identifying argument components (e.g., claim and premise)

-<u>Component identification:</u> Textual boundaries related to arguments

-<u>Structure identification:</u> Relations between the identified arguments (e.g., attack and support)

(C. Stab and I. Gurevych , 2017)

Text Segmentation

-Text segmentation involves the extraction of the fragments of text from the original piece that will form the constituent parts of the resulting argument structure

-Elementary Discourse Units (EDUs): non-overlapping spans of text corresponding to self-contained piece of argumentative content (e.g., premise, conclusion)

(J. Lawrence and C. Reed, 2020)

Argument / Non-Argument Classification

"Determining which of the segments previously identified are part of the argument being presented and which are not."

(J. Lawrence and C. Reed, 2020)

Example:

Michael Buerk: John Lamiday, thank you very much indeed for joining us this evening. Our third witness is Nick Dearden, who is director of the Jubilee Debt Campaign. *Mr Dearden, you'd like people not to have to pay their debts.* Where's the morality in that?

Nick Dearden: *I wouldn't like people not to have to pay their debts across the board.* But I think what we say is that *this isn't simply a matter of individual morality. Debt is used time and again as a set of economic decisions, and political decisions, to achieve certain things in society.* And *very often what high levels of debt can mean, and especially when the debt is on very unjust terms, is a massive redistribution of wealth in society, from the poorest to the richest.*
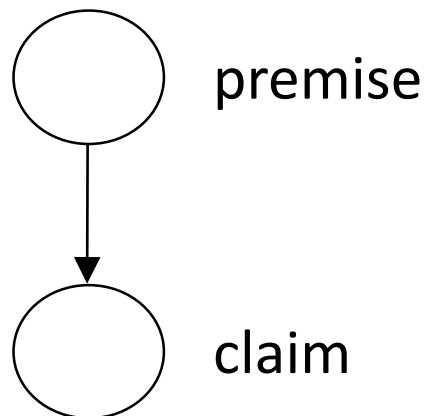
Argument Diagramming

"Transferring natural language arguments into a structured representation for evaluating them in subsequent analysis steps."

(J. Lawrence and C. Reed, 2020)

Argument Diagramming

- <u>Basic Argument:</u> Claim supported by a single premise

premise

claim

e.g. *this isn't simply a matter of individual morality*
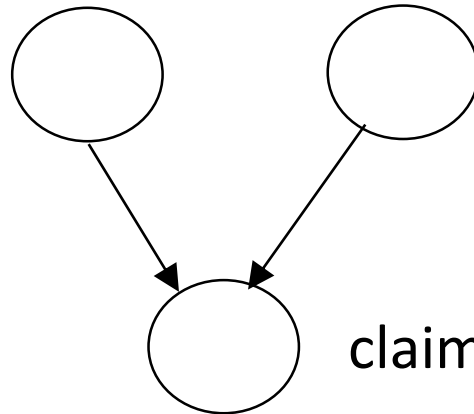
e.g. *Mr Dearden wouldn't like people not to have to pay their debts*

Argument Diagramming

- <u>Convergent Argument:</u> Two premises that support the claim individually

e.g. <u>*I wouldn't like people not to have to pay their debts across the board*</u>
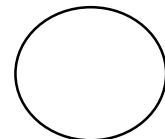
premise

premise

e.g. <u>*this isn't simply a matter of individual morality*</u>

claim

e.g. <u>*Mr Dearden wouldn't like people not to have to pay their debts*</u>
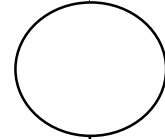
Argument Diagramming

- <u>Serial Argument:</u> Includes a reasoning chain

e.g. *<u>very often what high levels of debt can mean, and especially when the debt is on very unjust terms, is a massive redistribution of wealth in society, from the poorest to the riches</u>*
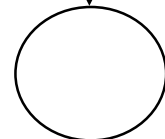
premise

intermediate conclusion

e.g. *<u>this isn't simply a matter of individual morality</u>*
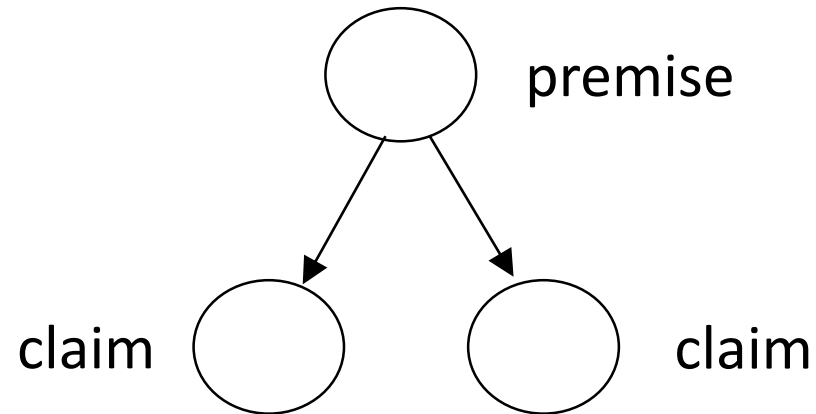
claim

e.g. *<u>Mr Dearden wouldn't like people not to have to pay their debts</u>*

Argument Diagramming

- <u>Divergent Argument:</u> A premise supports several claims

premise

claim   claim

e.g. *<u>this isn't simply a matter</u>*
<u>of individual morality</u>

e.g. *<u>Mr Dearden wouldn't like</u>*
<u>people not to have to pay their</u>
*<u>debts</u>*

e.g. *<u>And if it's not individual morality,</u>*
<u>then the state should take some of the</u>
<u>responsibility</u>
(if this was added in the ealier text)

Argument Diagramming

- Linked Argument: Includes two premises but neither of the two premises independently supports the claim

e.g. *Debt is used time and again as a set of economic decisions, and political decisions, to achieve certain things in society*
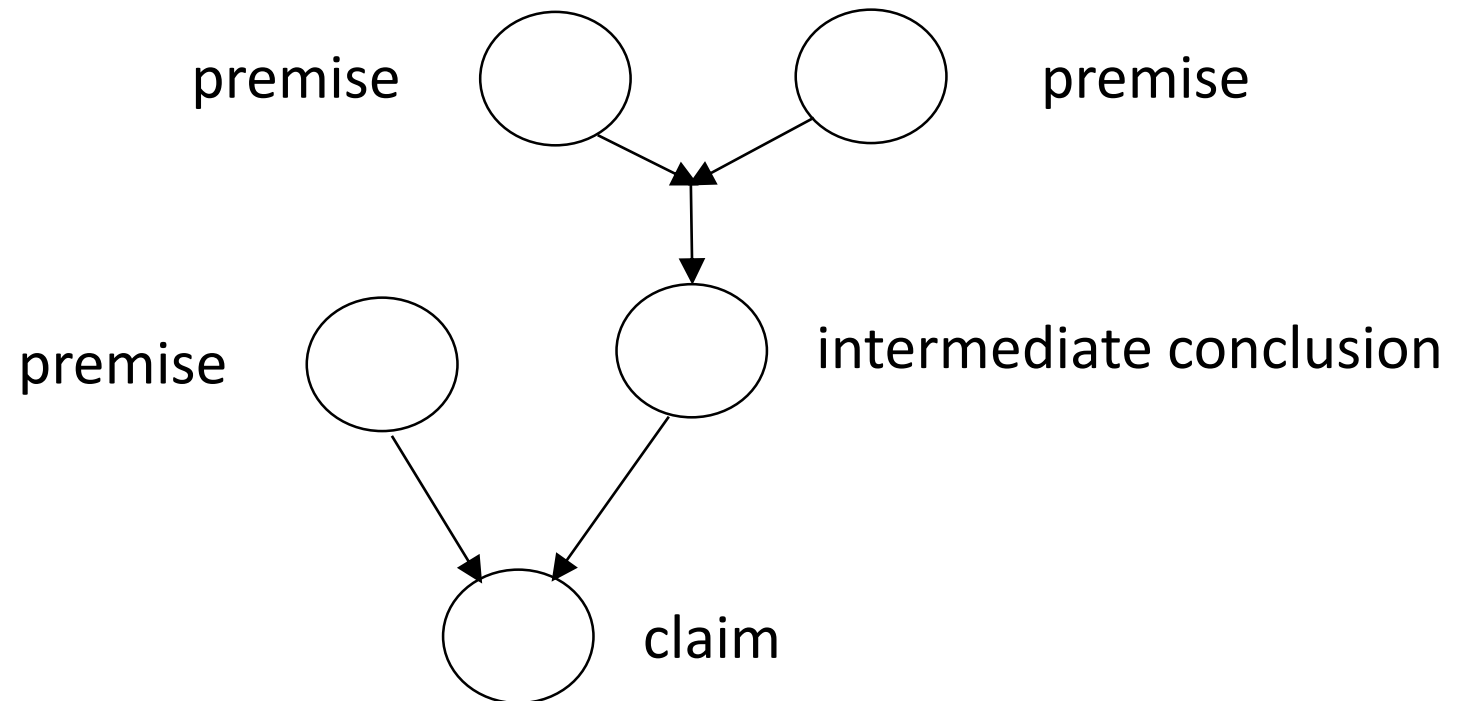
premise
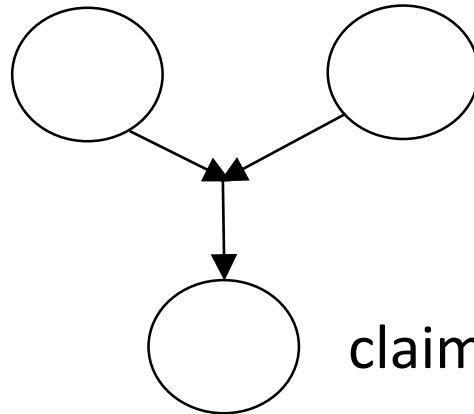
premise

e.g. *very often what high levels of debt can mean, and especially when the debt is on very unjust terms, is a massive redistribution of wealth in society, from the poorest to the riches*

claim

e.g. *this isn't simply a matter of individual morality*

Argument Diagramming

- <u>Hybrid Argument:</u> Involves several instances and combinations of the above elements into a larger, hybrid, argument structure

premise   premise

intermediate conclusion

premise

claim

Argument Diagramming

- <u>Hybrid Argument:</u> Involves several instances and combinations of the above elements into a larger, hybrid, argument structure

e.g. *very often what high levels of debt can mean, and especially when the debt is on very unjust terms, is a massive redistribution of wealth in society, from the poorest to the riches*

e.g. *Debt is used time and again as a set of economic decisions, and political decisions, to achieve certain things in society*

e.g. *I wouldn't like people not to have to pay their debts across the board*

e.g. *this isn't simply a matter of individual morality*
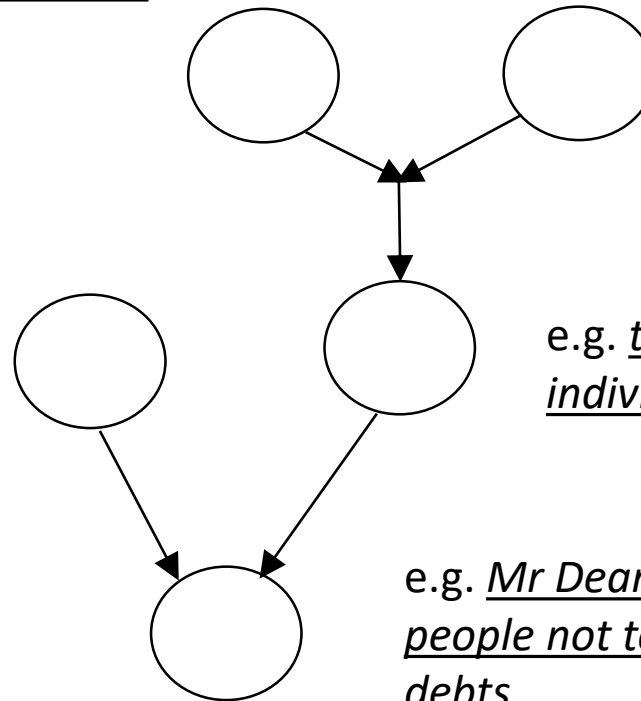
e.g. *Mr Dearden wouldn't like people not to have to pay their debts*

Argument Diagramming

- <u>Rebutting Attacks:</u> Rebutting arguments express a position that is directly incompatible with a conclusion

e.g. _<u>People who lend money,</u>_
<u>that is to say, people who save money, say through</u>
<u>building societies, are very ordinary people</u>
(later in example text)

e.g. _<u>debt is on very unjust terms, is a</u>_
<u>massive redistribution of wealth in society,</u>
<u>from the poorest to the riches</u>

Argument Diagramming

- <u>Undercutting Attacks:</u> Undercutting arguments attack or conflict with the inference between a premise and a conclusion, and, as such, offer a reason for no longer believing the conclusion, rather than for believing the negation of the conclusion

e.g. _If there were politicial decisions being taken, they are being taken by elected officers—so state actions don't require more than individual morality_
(new argument not previously appearing)
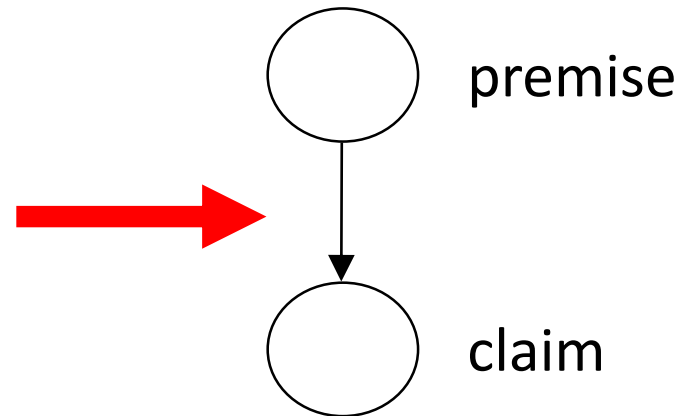
premise

claim

e.g. _this isn't simply a matter of individual morality_

e.g. _Mr Dearden wouldn't like people not to have to pay their debts_

Refined Structure

After recognising the basic argumentative structure, some analysis tools allow this to be refined further, identifying the argumentation scheme related to a particular structure.

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Refined Structure

- **Argumentation schemes** are patterns of inference, connecting a set of premises to a conclusion, that represent stereotypical patterns of human reasoning

- Schemes act like **inference rules** in structured argumentation

- Arguments are **evaluated** based on a set of **critical questions** corresponding to the scheme which, if not answered adequately, result in the argument to which the scheme corresponds defaulting

Argument from Expert Opinion Scheme

(D. Walton, 1996)

Major Premise: Source E is an expert in subject domain S containing proposition A
Minor Premise: E asserts that proposition A is true (false)
Conclusion: A is true (false)

Critical questions:
1. *Expertise Question:* How credible is E as an expert source?
2. *Field Question:* Is E an expert in the field F that A is in?
3. *Opinion Question:* What did E assert that implies A?
4. *Trustworthiness Question:* Is E personally reliable as a source?
5. *Consistency Question:* Is A consistent with what other experts assert?
6. *Backup Evidence Question:* Is E's assertion based on evidence?