Seminar Computational Sociolinguistics (CSL)

Negating Claims

Sanjay Gupta

SUPERVISOR: Milad Alshomary

June 09, 2021

PADERBORN UNIVERSITY

Outline

- **Motivation**

  Argument Clinic

- **Introduction**

  Argument mining, Argument Generation, CDCD, Contrastive claims, Automatic Claim Negation.

- **Negating claims approach**

  Using Semantic Heuristics, Rule-based approach, Data-based approach

- **Conclusion**

- **References**

Motivation

- **Monty Python's flying circus: Famous Argument Clinic Sketch.** (Bilu, Y., Hershcovich, D., and Slonim, N. 2015.)

Mr. Michael Palin (MP), Mr. John Cleese (JC).

MP: An argument isn't just contradiction.
JC: Well! it *can* be!
MP: No it can't! An argument is a connected series of statements intended to establish a proposition.
JC: No it isn't!
MP: Yes it is! It isn't just contradiction!
JC: Look, if I *argue* with you, I must take up a contrary position!
MP: Yes, but it isn't just saying 'no it isn't'.

Introduction

Argument Mining

(Bilu, Y., Hershcovich, D., and Slonim, N. 2015.)

- The goal of **argument mining** is to analyze argumentative structures from natural language text.
- In an **argumentative text**, facts and evidence are used to support a claim.
- A **claim** that conveys a stance on a controversial issue, implicitly or explicitly.
- A **Premise** is reason given to support the truth of the claim.

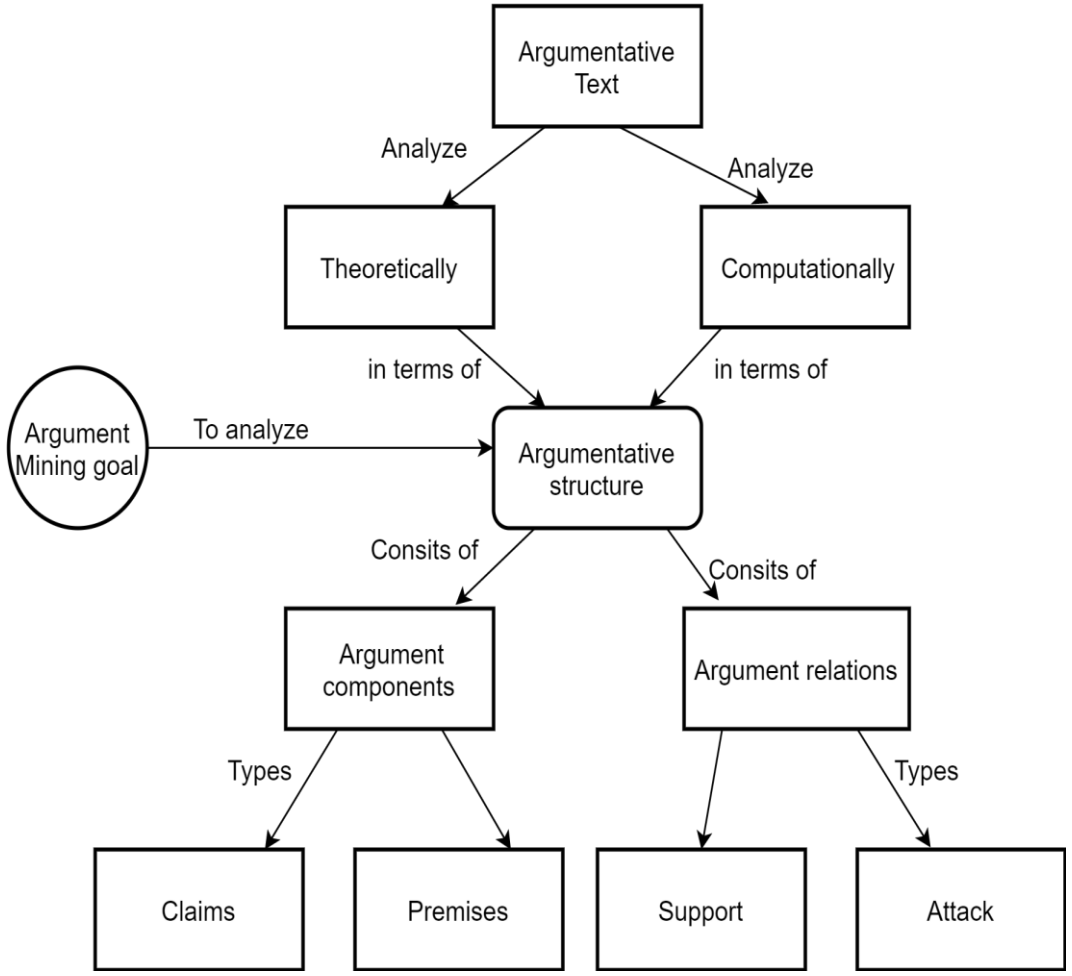


Fig. Building blocks of Argumentative Text

Argument Generation

(Hua et al., 2019)

- The generation of new arguments and argumentative text.
- Online debate system able to generate new arguments.

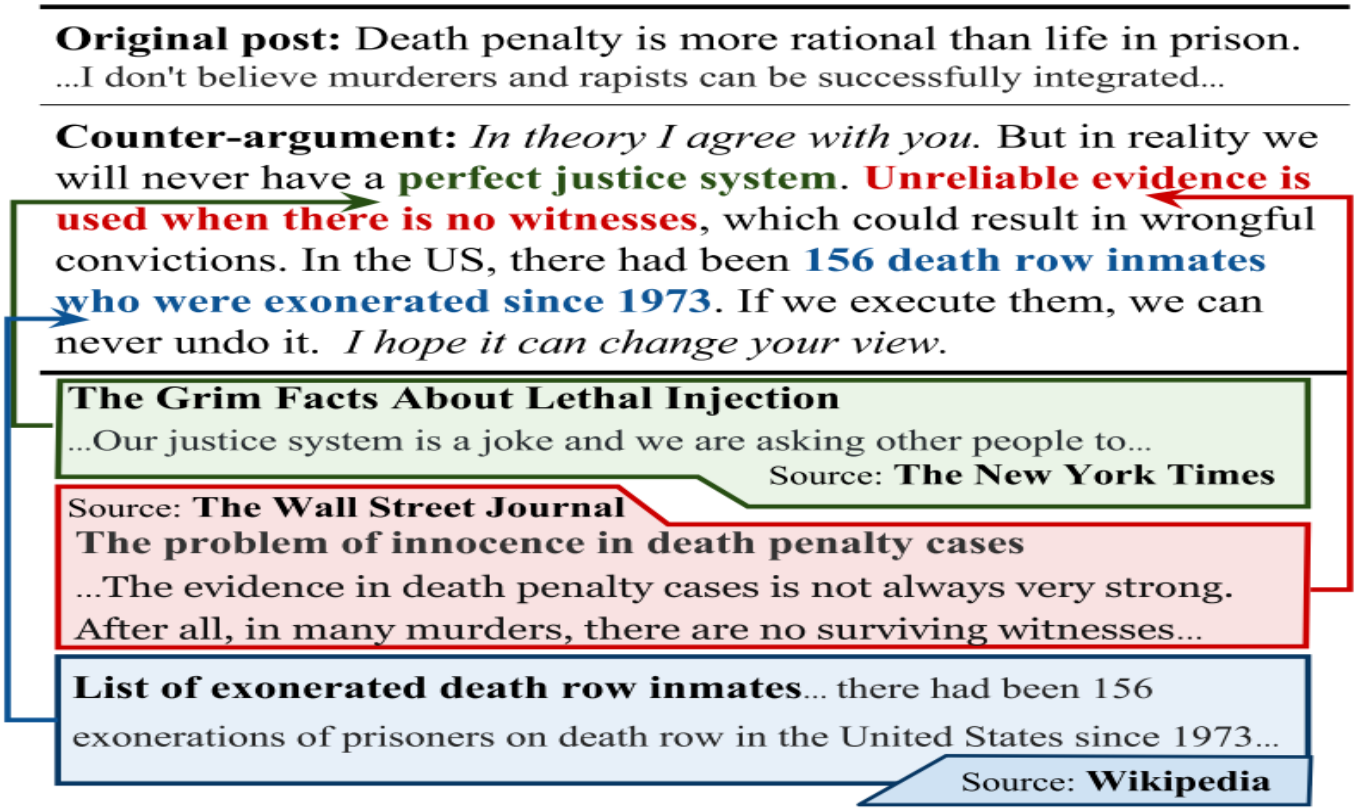
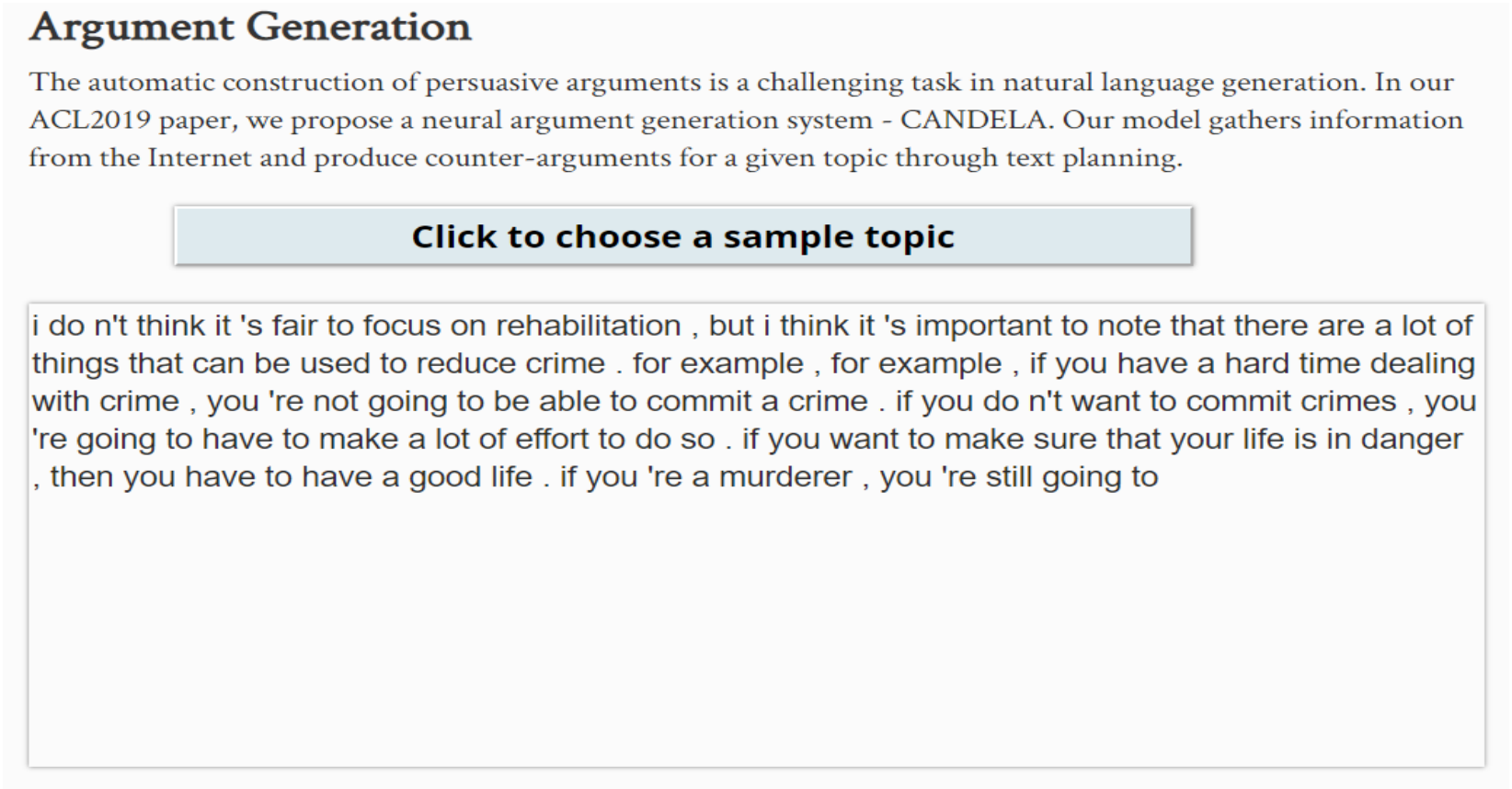


Fig. Sample counter-argument pro-death penalty post.

Argument Generation

(Hua et al., 2019)

- i.e.- CANDELA: a neural argument generation system (Text planning, Content realization).
  - Topic: Any sentencing above 45 years in prison is pointless.



Context Dependent Claim Detection

(Levy et al., 2014)

- The goal is to extract CDCs from argumentative structures automatically.
- We define the following two concepts:
  - **Topic:** A short phrase that frames the discussion.
  - **Context Dependent Claim (CDC):** A general, concise statement that directly supports or contests the given topic.

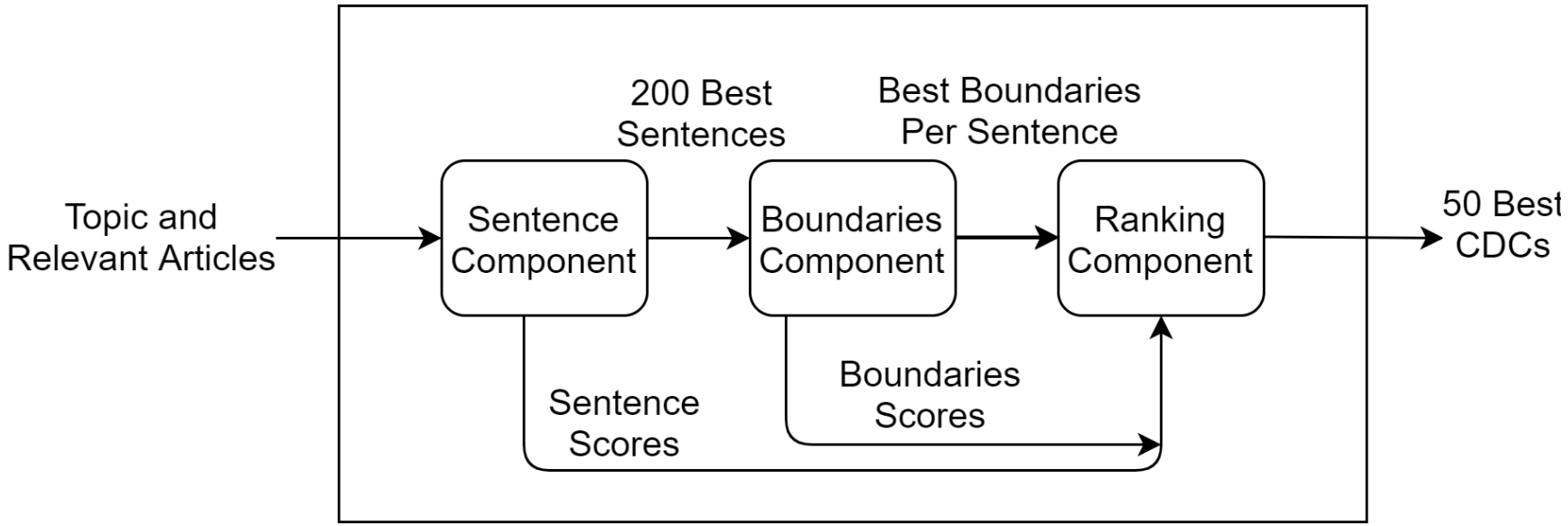


Fig. System design of CDCD.

Context Dependent Claim Detection

(Levy et al., 2014)

- i.e.-

Topic: The sale of violent video games to minors should be banned		
S1	Violent video games can increase children's aggression	V
S2	Video game addiction is excessive or compulsive use of computer and video games that interferes with daily life	X
S3	Many TV programmers argue that their shows just mirror the violence that goes on in the real world	X
S4	Violent video games should not be sold to children	X
S5	Video game publishers unethically train children in the use of weapons	V

Contrastive claims

(Hidey and McKeown, 2019)

- A contrastive claim is one that is likely to be contradictory if made by the speaker of the original claim.
- It may differ in more than just viewpoint; they may also contain stylistic differences and paraphrases, among other aspects.
  - i.e.-

    Claim: Hillary Clinton should be president.

    Contrastive claim: Bernie Sanders should be president.

Automatic Claim Negation

(Hidey and McKeown, 2019., Ahmed and Lin, 2014.)

- The detected claims can be augmented further, by adding to it the negation of each detected claim.

- Negation limits the diversity of responses that can lead to a productive dialogue.
  - i.e.-

    Claim: Get employers out of the business, pass universal single payer healthcare.

    Negated Claim: Do not get employers out of the business, do not pass universal healthcare.

    Suggestion: Get employers out of the business, deregulate and allow cross-state competition.

- Benefits:
  - **Bioinformatics:**
    - Where detecting negation is crucial in, for instance, reaching the right diagnosis.
    - Determine relationships between symptoms and diseases.
  - **Internet bot:** Generating smooth and adaptive conversation.

Approach

Using Semantic Heuristics

(Ahmed and Lin, 2014.)

- Goal: To generate the negation of a given statement.
- Challenges:
  - What to Negate (scope detection)?
    - Detects all possible scopes of a statement.
  - How to negate (generating the statements)?
    - By using ***NOT*** on the negative parts.

Using Semantic Heuristics

(Ahmed and Lin, 2014.)

- Workflow of the system:

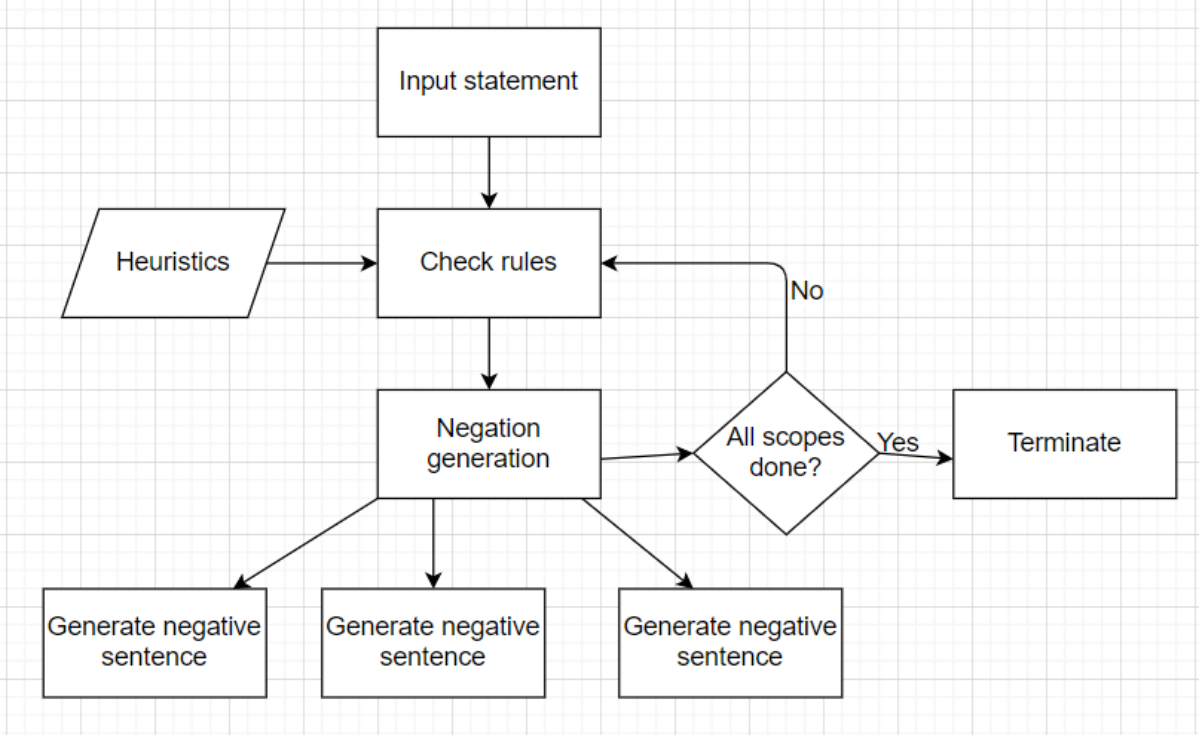


Fig. Workflow of the system.

Using Semantic Heuristics

(Ahmed and Lin, 2014.)

- Part of Speech tagging and Scope detection:
  - The heuristics are as follows:

1. If a sentence starts with Noun Phrase (NP) and NP is followed by a verb phrase (VP) then the NP is a scope. Example: : [The cow] NP [eats grass]VP. So "The cow" is a scope.
2. Adjectives of the sentence. Example: She is [good]Adj at math. "Good" here is a scope
3. If there is any Prepositional phrase (PP) after a verb (VB), then the PP is scope. Example: [The baby]NP [eats rice]VP [with spoon]PP. "With spoon" is a scope.
4. An adverbial phrase after a verb. Example: She went to meeting [on Monday]. "on Monday" is a scope.
5. Verbs and verb arguments (NP that are children of the verb phrase in the parse tree). Example: She [ate]VB chips and biscuits. Scopes: "ate", "chips", "biscuits"
6. Pre-determiners. Example: All the people left the place. All (the pre-determiner) is a scope.

Using Semantic Heuristics

(Ahmed and Lin, 2014.)

- Negation generation (and making it human friendly):
  - Verbs: Simplest case. Just adding “not” i.e.- do not or does not.
  - Adverbs and Adjectives: Replacing an appropriate antonym of the corresponding's.
  - Pre-determiners: i.e.- all to not all, either to neither etc.
  - Nouns: types.

- i.e.- The cow eats grass with spoon.

After tagging: The_DT cow_NN eats_VBZ grass_NN with_IN spoon._NN

Scope verb (eats): Negated Statement:: The cow *doesn't* eat grass with spoon

Scope PP after verb (with spoon): Negated Statement: The cow eats grass with *something other than spoon*

Scope NP (The cow): Negated Statement. *Something other than the cow* eats grass with spoon

Using Semantic Heuristics

(Ahmed and Lin, 2014.)

- Implementation:
  - Core Java: Main program. (https://www.java.com/en)
  - OpenNLP: Tagging and Parsing for scope detection. (https://opennlp.apache.org/)
  - Wordnet: Lexical database for the English language i.e.- Synsets. (https://wordnet.princeton.edu/)
  - RiTa Wordnet: Incorporate Wordnet into Java Program. (https://elmcip.net/platformsoftware/rita)
  - Nltk for python: Synsets classification for Wordnet. (https://www.nltk.org/)
- Limitations:
  - Does not work well with compound sentences.
    - i.e.- I like dogs but my friend likes cats.

Rule-based approach

(Bilu, Y., Hershcovich, D., and Slonim, N. 2015.)

- Goal: How to use generated negative claims plausibly in debate-support system.
- Problem:
  - How to automatically negate a claim?
  - When such a negated claim can be plausibly be used?
- Challenges:
  - Four levels of complexity: In automatically generate Claim Negations.
    - Grammer: New text should be grammatically correct.
      - i.e.-
        - Claim: As a standard embryo does have a highly valuable future, killing it is seriously wrong.
        - Negated Claim: As a standard embryo does ***does not*** have a highly valuable future, killing it is seriously wrong.

Rule-based approach

(Bilu, Y., Hershcovich, D., and Slonim, N. 2015.)

- Clarity: Grammatically correct, but unclear and incoherent.
  - i.e.-
    - Claim: School should be made to fit the child, rather than the other way around.
    - Negated Claim: School should ***not*** be made to fit the child, rather than the other way around.
- Opposition: Grammatically correct, and even clear, but still not expressing the opposite of the original Claim.
  - i.e.-
    - Claim: Children who fail to engage in regular physical activity are at greater risk of obesity.
    - Negated Claim: Children who ***do not*** fail to engage in regular physical activity are at greater risk of obesity.

Rule-based approach

(Bilu, Y., Hershcovich, D., and Slonim, N. 2015.)

- Usability: Satisfies the above three criteria, may still not be plausible to use while discussing the Topic.
  - i.e.-
    - Claim: The selection process should not be based on some arbitrary or irrelevant criterion.
    - Negated Claim: The selection process ***should*** be based on some arbitrary or irrelevant criterion.

Rule-based approach

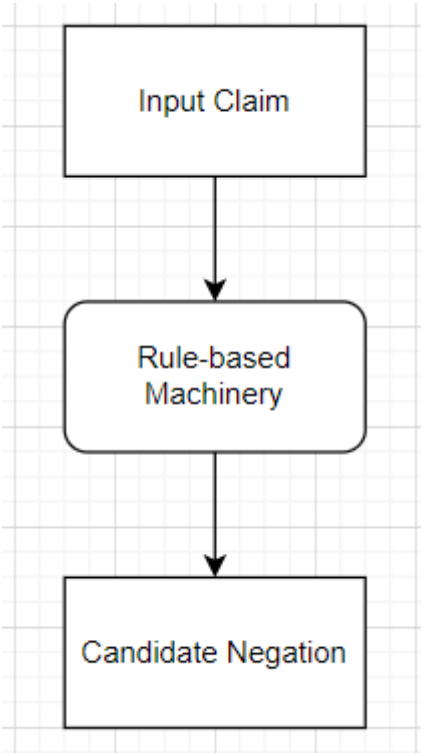
(Bilu, Y., Hershcovich, D., and Slonim, N. 2015.)

- Algorithm:
  - Preliminary analysis: To better understand where the most of the challenge lies.
    - 5 annotators, 200 claims (Aharoni et al., 2014)
    - Determine difficulty level of generated nagative claims.
      - Type 1 (Simple): i.e.- Adding/removing **no, not, does not,** or **do not.**
      - Type 2 (Complex): if annotators could think of a negation, but not of Type1.
      - Type 3 (none available): Annotator could not easily phrase a clear negation.
    - Results:
      - 75% of the Claims that can be negated by simple rules.
      - 23.5% negation would be usable.
      - Usability is more important than grammar.

Rule-based approach

(Bilu, Y., Hershcovich, D., and Slonim, N. 2015.)

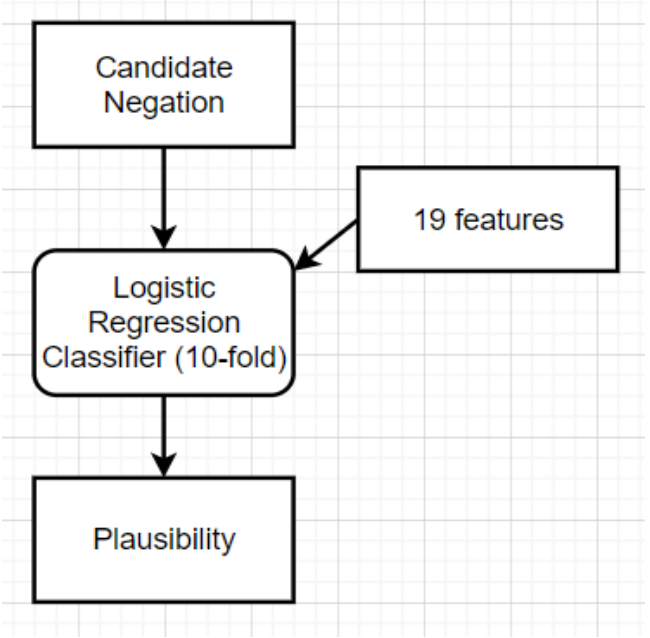
- Algorithm:
  - Claim negation: How?: Aims to generate candidate negation of claims.
    - Tokenize the Claim and label the tokens for parts-of-speech.
    - Insert the words “does not” or “do not”



Rule-based approach

(Bilu, Y., Hershcovich, D., and Slonim, N. 2015.)

- Algorithm:
  - Claim negation: When?: Aims to determine candidate negation usability.
    - Data Sets: 1,240 pairs of the form (Claim, candidate negation)
    - Features: Counts, Tokens (and, or, than), PoS Tags (VBZ, VBP, MD), Sentiment, Rule-based machinery steps, Frequency in real world corpora.
  - Results:
    - Grammer: 96%
    - Clarity and Opposition: 80%
    - Usability: 50%
  - Limitations:
    - Generating opposing/negating claims via explicit negation.



Data-based approach

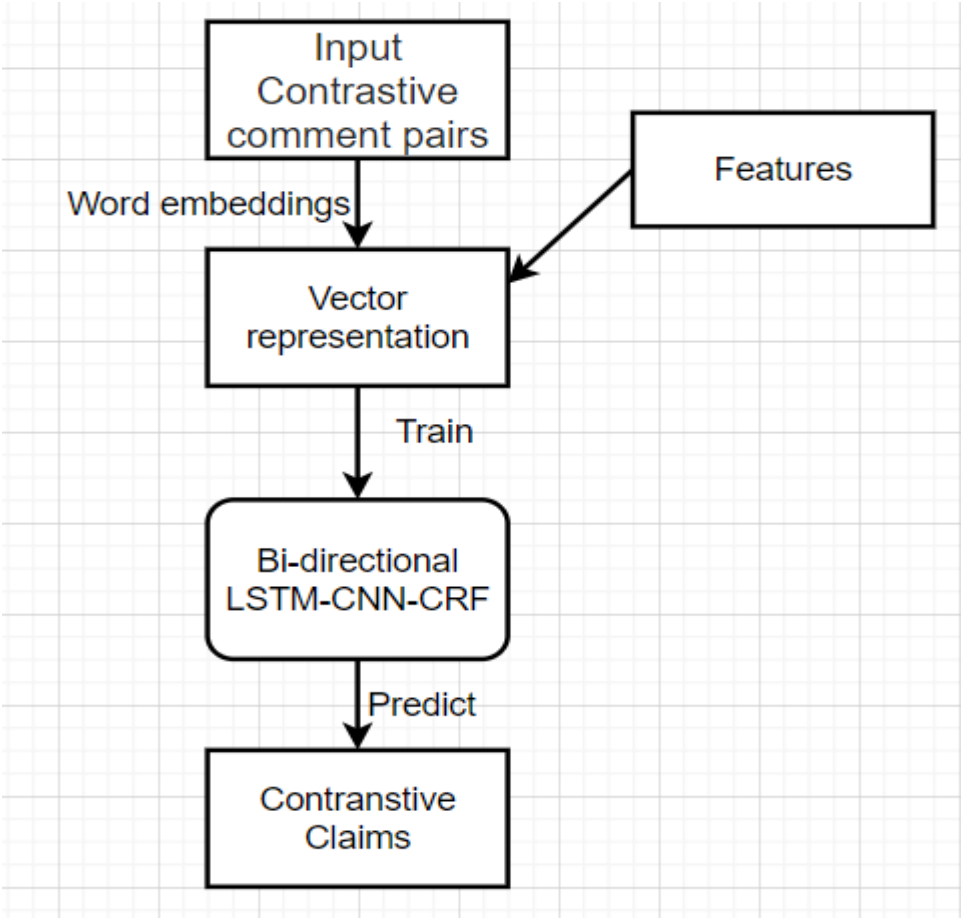
(Hidey and McKeown, 2019.)

- Goal: To generate new claim with a different view (Contrastive claims).
- To generate counter-argument then we need to generate a response in comapre to the main claim of the original argument.
- Data:
  - Corpus: 1,083,520 contrastive comment pairs scrape from Reddit acronym FTFY (Fixed that for you.)
  - For training: 1,066,717 contrastive comment pairs.
  - For test: 6,773 contrastive comment pairs.
  - For development: 10,307 contrastive comment pairs.

Data-based approach

(Hidey and McKeown, 2019.)

- Work flow of algorithm:



Data-based approach

(Hidey and McKeown, 2019.)

- i.e.-

Parent: ah yes the wonders of the free market
Model: ah yes the wonders of government intervention
Parent: i know that this is an unofficial mod , but xp is the best os for this machine
Model: linux is the best os for this machine
Parent: that 's why it 's important to get all your propaganda from infowars and brietbart
Model: propaganda from fox news outlets

- Result:
  - BLEU score is 47.28.

(Papineni et al., 2002)

Conclusion

- From a given input claim, a automatic claim negation can automatically generate all possible negations.
- The automatic Claim negation system is rather naïve.
- An algorithm that, given a Claim, automatically generates a possible negation, and further determines the plausibility of using this negation to refute the original Claim.
- Corpus of over 1 Million contrastive claims pairs available.
- We can incorporate Data-based approach into a argumentative debate systems.

References

- **Ahmed and Lin, 2014.** Afroza Ahmed and King Ip Lin. Negative Sentence Generation by Using Semantic Heuristics. 2014. The 52nd Annual ACM Southeast Conference (ACMSE 2014), Kennesaw, GA, USA.

- **Bilu, Y., Hershcovich, D., and Slonim, N. 2015.** Yonatan Bilu, Daniel Hershcovich, and Noam Slonim. 2015. Automatic claim negation: Why, how and when. In Proceedings of the 2nd Workshop on Argumentation Mining, pages 84–93. Association for Computational Linguistics.

- **Hidey and McKeown, 2019.** Christopher Hidey and Kathy McKeown. 2019. Fixed that for you: Generating contrastive claims with semantic edits. In Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, Volume 1 (Long and Short Papers), pages 1756–1767, Minneapolis, Minnesota. Association for Computational Linguistics.

- **Levy et al., 2014.** Ran Levy, Yonatan Bilu, Daniel Hershcovich, Ehud Aharoni and Noam Slonim. Context Dependent Claim Detection 2014. In The 25th International Conference on Computational Linguistics.

- **Aharoni et al., 2014.** Ehud Aharoni, Anatoly Polnarov, Tamar Lavee, Daniel Hershcovich, Ran Levy, Ruty Rinott, Dan Gutfreund, Noam Slonim. A Benchmark Dataset for Automatic Detection of Claims and Evidence in the Context of Controversial Topics 2014. Workshop on Argumentation Mining, ACL.

- **Papineni et al., 2002.** Kishore Papineni, Salim Roukos, Todd Ward, and Wei- Jing Zhu. 2002. Bleu: a method for automatic evaluation of machine translation. In Proceedings of 40th Annual Meeting of the Association for Computational Linguistics, pages 311–318, Philadelphia, Pennsylvania, USA. Association for Computational Linguistics.

References

- **Hua et al., 2019.** Xinyu Hua, Zhe Hu, and Lu Wang. 2019. Argument generation with retrieval, planning, and realization. In Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics, pages 2661–2672, Florence, Italy. Association for Computational Linguistics.

Thank You!!

Q&A