

Trauma and Violence Detection with Natural Language Processing

Miriam Schirmer
SICSS Berlin 2024

Outline

**Language of
Trauma**

**Trauma in the
Context of
Genocide**

**Trauma Beyond
Genocide**

OVERVIEW

Motivation

Nedžad Avdić (survivor of the Srebrenica Massacre)

After such a tragedy, the ICTY [International Criminal Tribunal for the former Yugoslavia] was the only hope at the time and the only light for us survivors. In the end, it was my moral obligation and the only thing I could do for my killed father, my killed uncles, for my schoolmates, for my friends, for my relatives and neighbours.

<https://www.genocide-alert.de/interview-with-srebrenica-survivor-nedzad-avdic/>



Armed Conflict

(Hassan et al., 2015;
Peltonen, 2004)

Bereavement and Grief

(Neria et al., 2004;
Stroebe et al., 2001)

Moral Injury

(Litz et al., 2009;
Ter Heide & Olf, 2023)

Child Maltreatment

(Cicchetti & Toth, 2005;
Sanders & Becker-Laussen,
1995)

Forced Displacement

(Morina et al., 2018; Myles
et al., 2018)

Climate Change

(Doherty & Clayton, 2011;
Woodbury, 2019)

Trauma and Ageing

(Lapp et al., 2011;
Krystal, 1995)

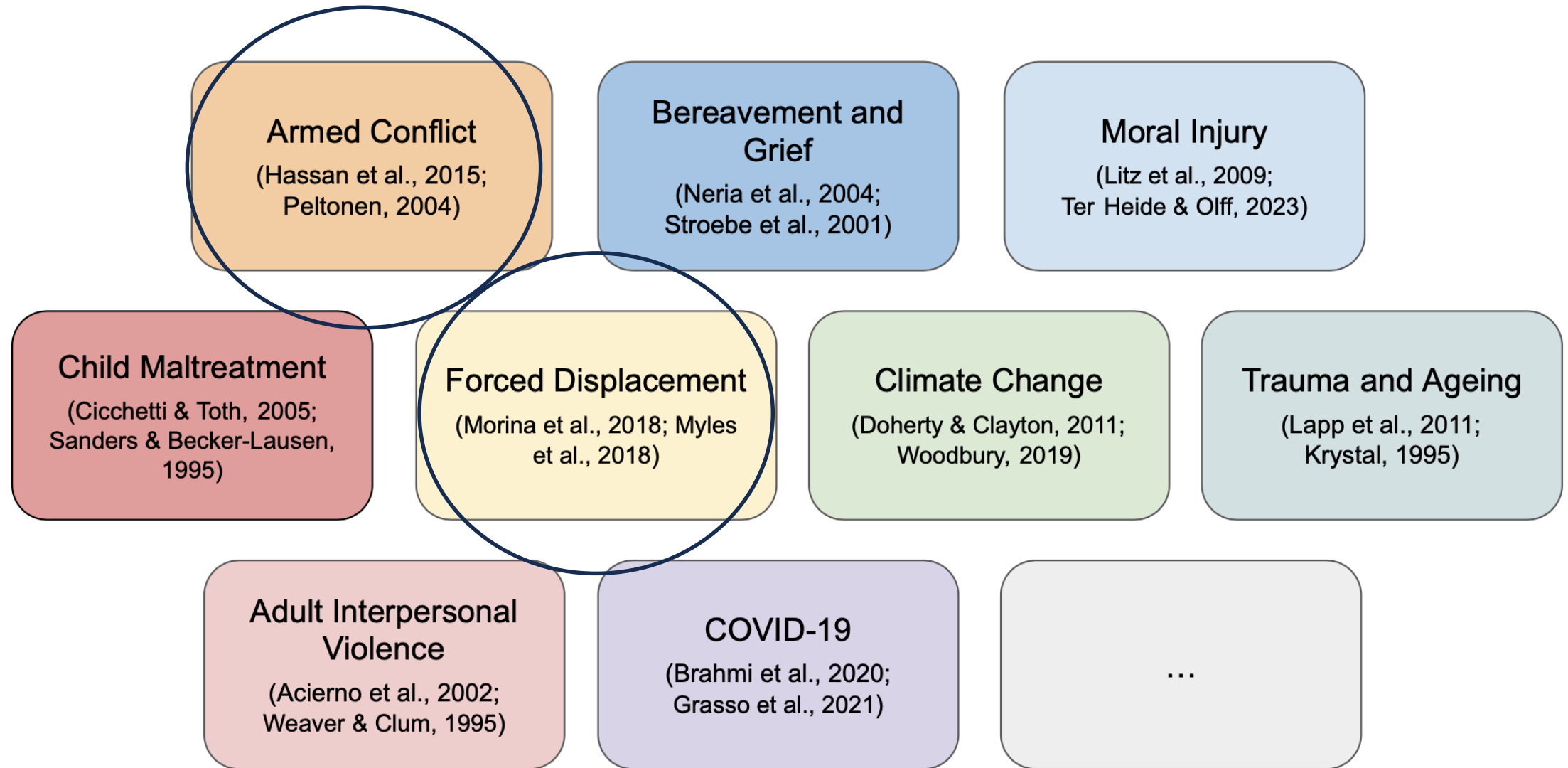
Adult Interpersonal Violence

(Acierno et al., 2002;
Weaver & Clum, 1995)

COVID-19

(Brahmi et al., 2020;
Grasso et al., 2021)

...



Motivation

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**Risk of re-traumatization
(van Schaack et al, 2011)**

Why use NLP in Genocide Research?

The **International Criminal Tribunal for the former Yugoslavia (ICTY)** as an example:



<https://www.icty.org/node/9590>

- Comprehensive analysis of large text datasets (open access)
- Detect patterns throughout different trials
- Real-time monitoring and intervention
- Improve support mechanisms

Trauma Detection in Court Transcripts

How **exposed** are witnesses to describing **potentially traumatic content** and how can we **automatically identify** related text segments?

Improve Support Guidelines
Train Court Professionals
Reduce Risks of Retraumatization

Outline

Language of
Trauma

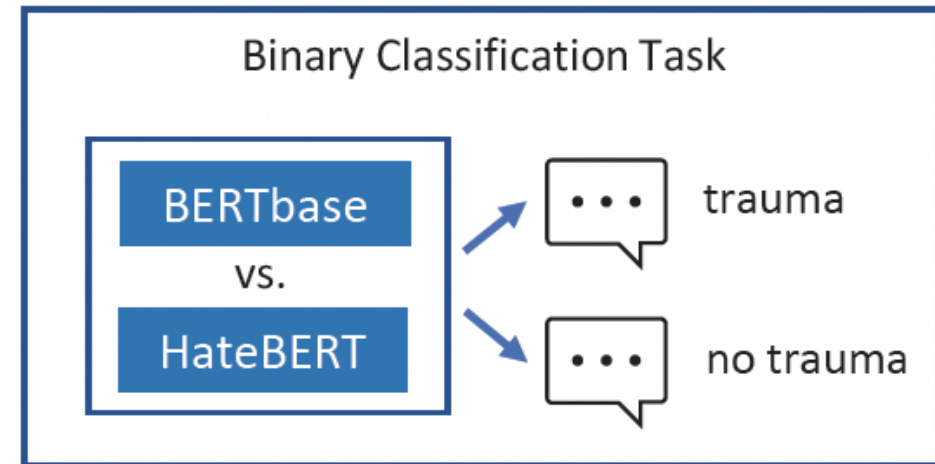
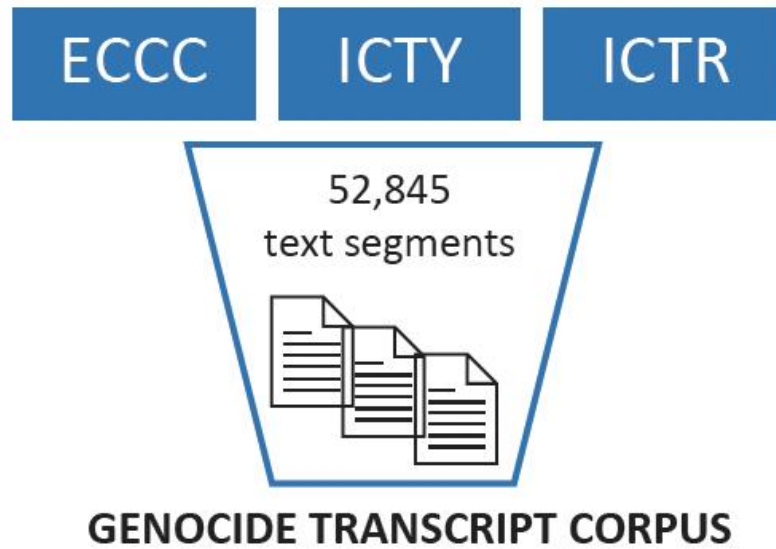
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METHOD & FINDINGS

Trauma Detection in Court Transcripts

Cambodia / Former Yugoslavia / Rwanda



Example
from the
ECCC
(Cambodia)

13 MR. PRESIDENT:

14 The defence counsel, the floor is yours.

15 MS. CANIZARES:

16 Thank you, Mr. President.

17 [15.39.19]

18 BY MS. CANIZARES:

19 Q.Sir, you have described the conditions under which you lived
20 at S-21. Could you please tell us why you did not wish to join
21 as a civil party?

22 A.Ms. Lawyer, people have different ideas, have different
23 purposes and objectives. First, my main concern was my health;
24 that I would not be able to attend regularly during the trial
25 proceedings.

Genocide Transcript Corpus (GTC)

13 MR. PRESIDENT:
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text

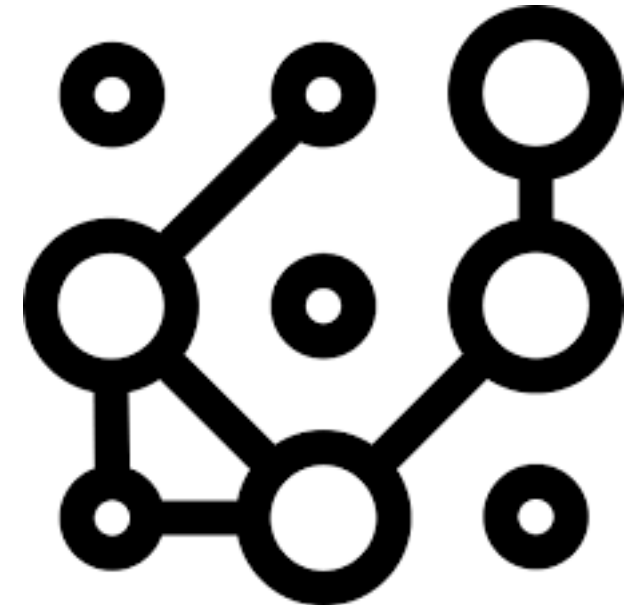
MR. PRESIDENT: Good morning
 MR. HOMETOWU: Thank you, M
 MR. PRESIDENT: Appearances,
 MR. WEBSTER: Good morning,
 MR. PRESIDENT: Has Mr. Morle
 MR. WEBSTER: No. That was a
 MR. PRESIDENT: Thank you.
 MS. DIAGNE-MBAYE: Good mo
 MS. HOUNKPATIN: Good morni
 MR. ROBINSON: Good morning
 MR. PRESIDENT: Thank you. Mr
 MS. DIAGNE-MBAYE: Quite cor
 MR. PRESIDENT: I'm just going t
 MR. HOMETOWU: Thank you, M
 MR. PRESIDENT: Thank you ver
 MR. HOMETOWU: Mr. Presiden
 MR. PRESIDENT: Th

Capturing Trauma

- **Trauma detection is a very sensitive and difficult task**
- **Individual Variability:**
 - Trauma manifests differently (Berger, 2015)

How can we capture trauma based on text data alone?

- Research on detecting trauma with NLP is only emerging, mainly in clinical contexts (e.g., in patient narratives of veterans; He et al., 2019)



Labeling Potentially Traumatic Events

Psychological Definition according to the American Psychiatric Association (APA, 2013)

- “exposure to actual or threatened death, serious injury, or sexual violence” that is either experienced directly or witnessed
- “learning that the traumatic event(s) occurred to a close family member or close friend”

Manual labeling of witness text segments regarding their traumatic content

- 0 = no trauma, 1 = trauma (accounts of potentially traumatizing experiences)
- Labeled by three psychologists (B.Sc.) according to this definition
- Interrater Reliability: Fleiss' $\kappa = 0.86$

Labeling Potentially Traumatic Events

Example Positive Trauma Label – **TRIGGER WARNING**

"And when we were allowed to do exercise, our legs were still shackled to the metal bars and we could like hop to do exercise. If we didn't hop then they would beat us also."

Trauma Event Detection in Court Transcripts: Results

Almost **14%** of witness statements in the three tribunals include reports of potentially traumatizing experiences.

Algorithm was able to detect relevant text segments with an F1 score of **91%**.

LREC-COLING
2024

GENTRAC: A Tool for

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Miriam Schirmer, Christian

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{miriam.schirmer, christia

GENTRAC

A Tool for Automated Trauma Detection in Court Transcripts

This tool identifies statements of potentially traumatic experiences in witness accounts for the International Criminal Court (ICC), the International Criminal Tribunal for the former Yugoslavia (ICTY), the International Criminal Tribunal for Rwanda (ICTR), and the Extraordinary Chambers in the Courts of Cambodia (ECCC).

How to use GENTRAC:

1. Find a transcript from the ICC, the ICTR, the ICTY, or the ECCC. The buttons below provide links to the court websites where transcripts are publicly accessible.
2. Insert the transcript link into the designated field.
3. Choose whether you would like to download a CSV file containing segmented data from the transcript.
4. By clicking 'Detect Trauma', the transcript will be processed. Various metrics associated with the transcript, such as the share of trauma-related statements, will be displayed.

ICC

ICTR

ICTY

ECCC

TRANSCRIPT LINK

EXAMPLE: [HTTPS://WWW.ICC-CPI.INT/SOME/TRANSCRIPT](https://www.icc-cpi.int/some/transcript)

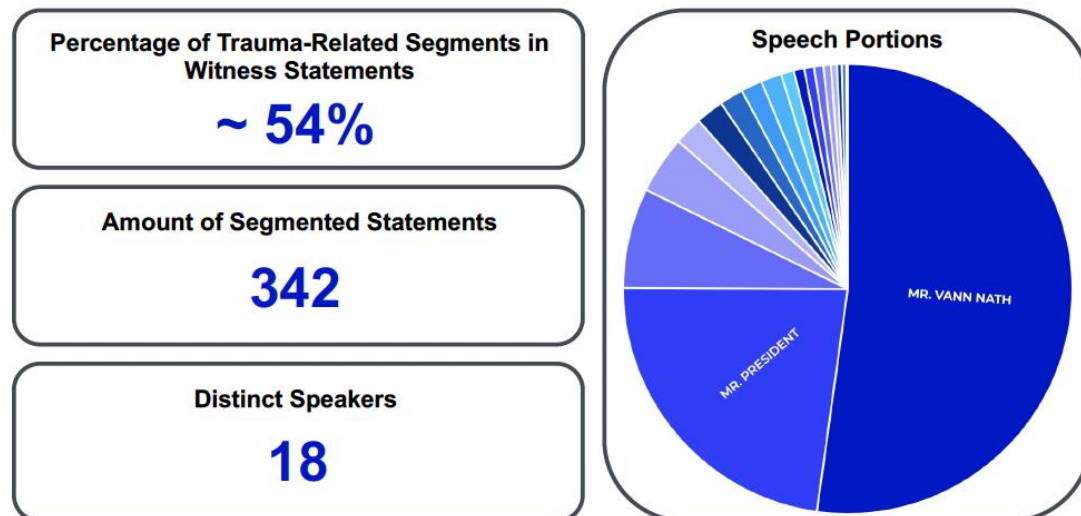
DOWNLOAD CSV



DETECT TRAUMA

DETECT TRAUMA

<https://gentrac.tox.report>



- **Legal Analysis and Advocacy:**
Enhance understanding and advocacy in human rights cases based on trauma expressed in testimonies
- **Historical and Societal Research:**
Aid researchers in quantifying the psychological impacts of war crimes
- **Educational and Policy Development:** Facilitate education on the effects of war crimes and inform policy formulation to prevent and address such crimes

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How about trauma in other contexts?



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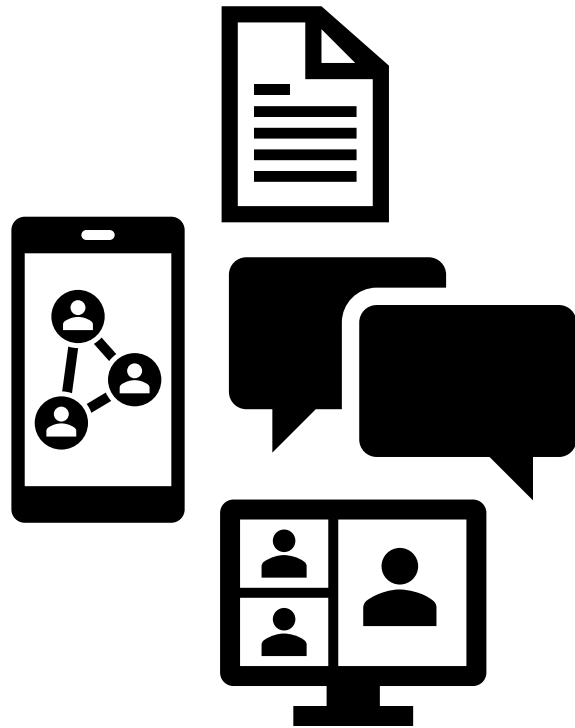
**Adult Interpersonal
Violence**

(Acierno et al., 2002;
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...



These types of trauma can be found in various text resources, e.g., court transcripts, social media data, mental health forums, ...

Can we use a model trained on one type of trauma to detect other types of trauma?

How transferable is trauma detection?

Data Overview

Genocide Transcript
Corpus

Extreme case of
trauma

Court context
„truth“

Reddit PTSD

PTSD directly
connected to trauma

Social Media context

Open online forum

Counseling
Conversations

Counseling context

Conversational
aspects

Expert answers

Incel Dataset

“Control dataset”:
We expect less
trauma events, but
high share of violent
language and other
mental health topics
(depression, anxiety,
mobbing)

GTC

Armed Conflict
(Hassan et al., 2015;
Peltonen, 2004)

Counseling

**Bereavement and
Grief**
(Neria et al., 2004;
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How trauma became the word of the decade

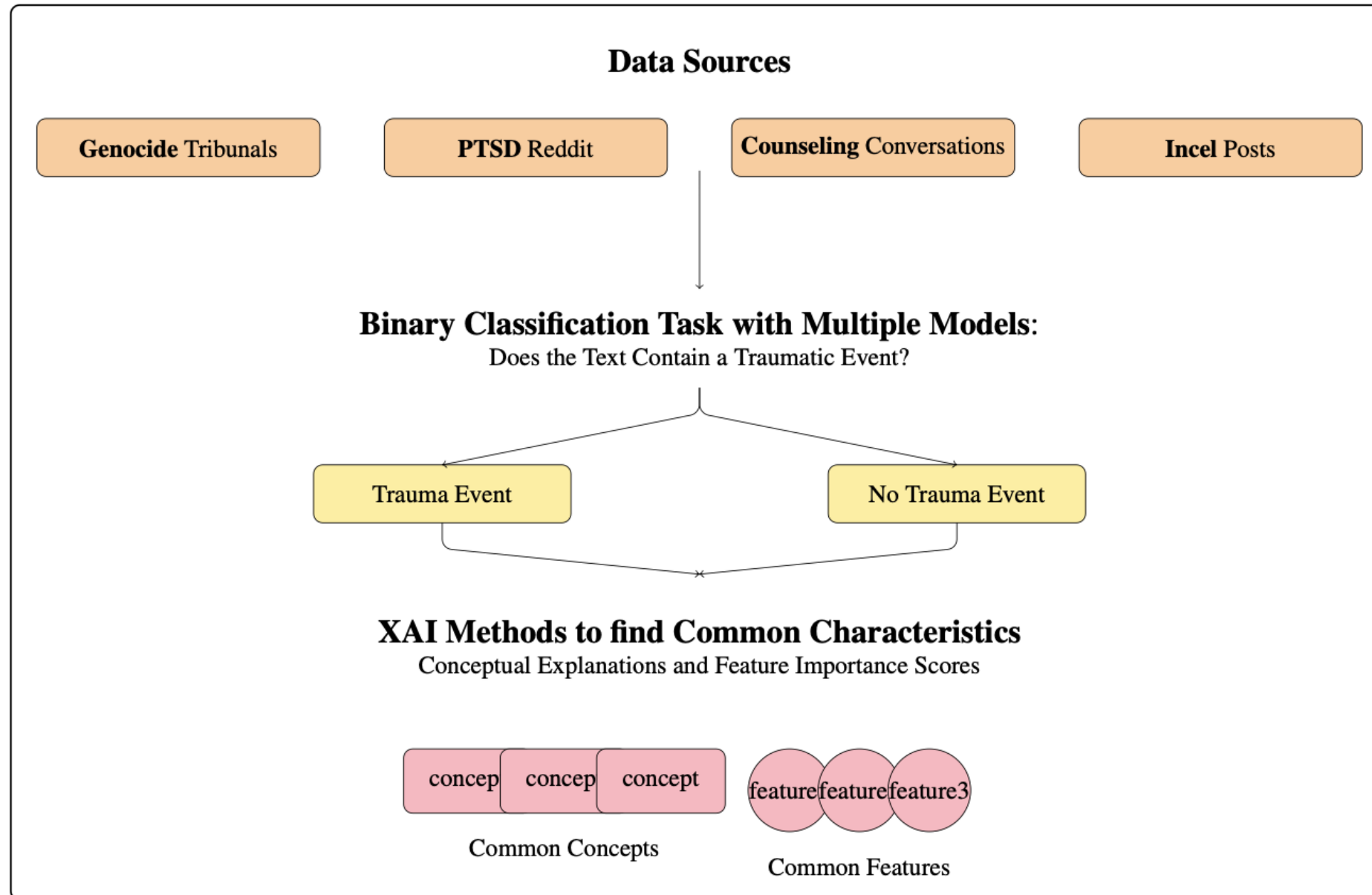
The very real psychiatric term has become so omnipresent in pop culture that some experts worry it's losing its meaning.

By Lexi Pandell | Updated Jan 25, 2022, 8:01am EST

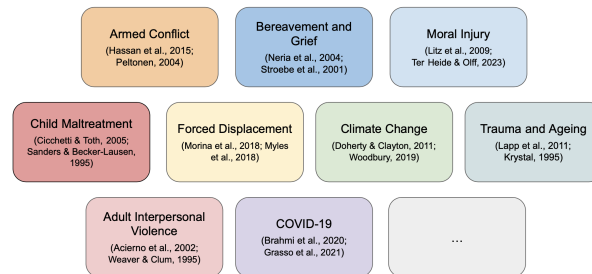
Illustration by Bráulio Amado for Vox



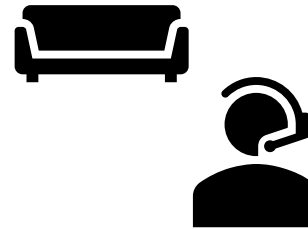
<https://www.vox.com/the-highlight/22876522/trauma-covid-word-origin-mental-health>



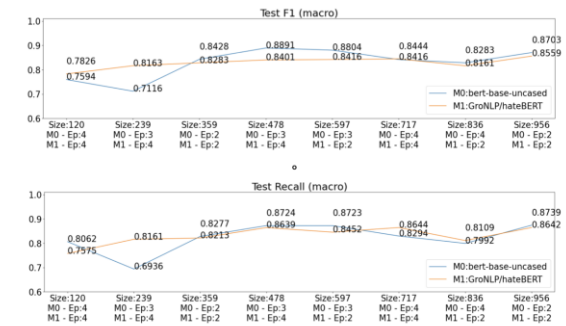
Trauma Transfer: Contributions



Conceptualization

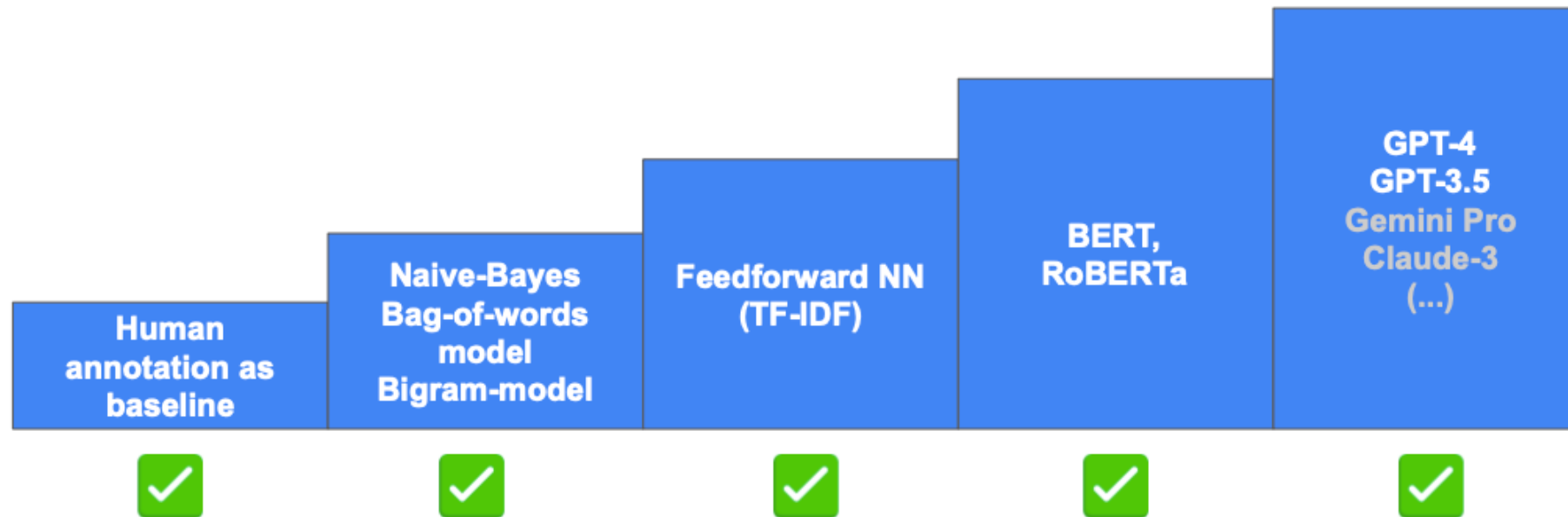


Facilitate Access to Support

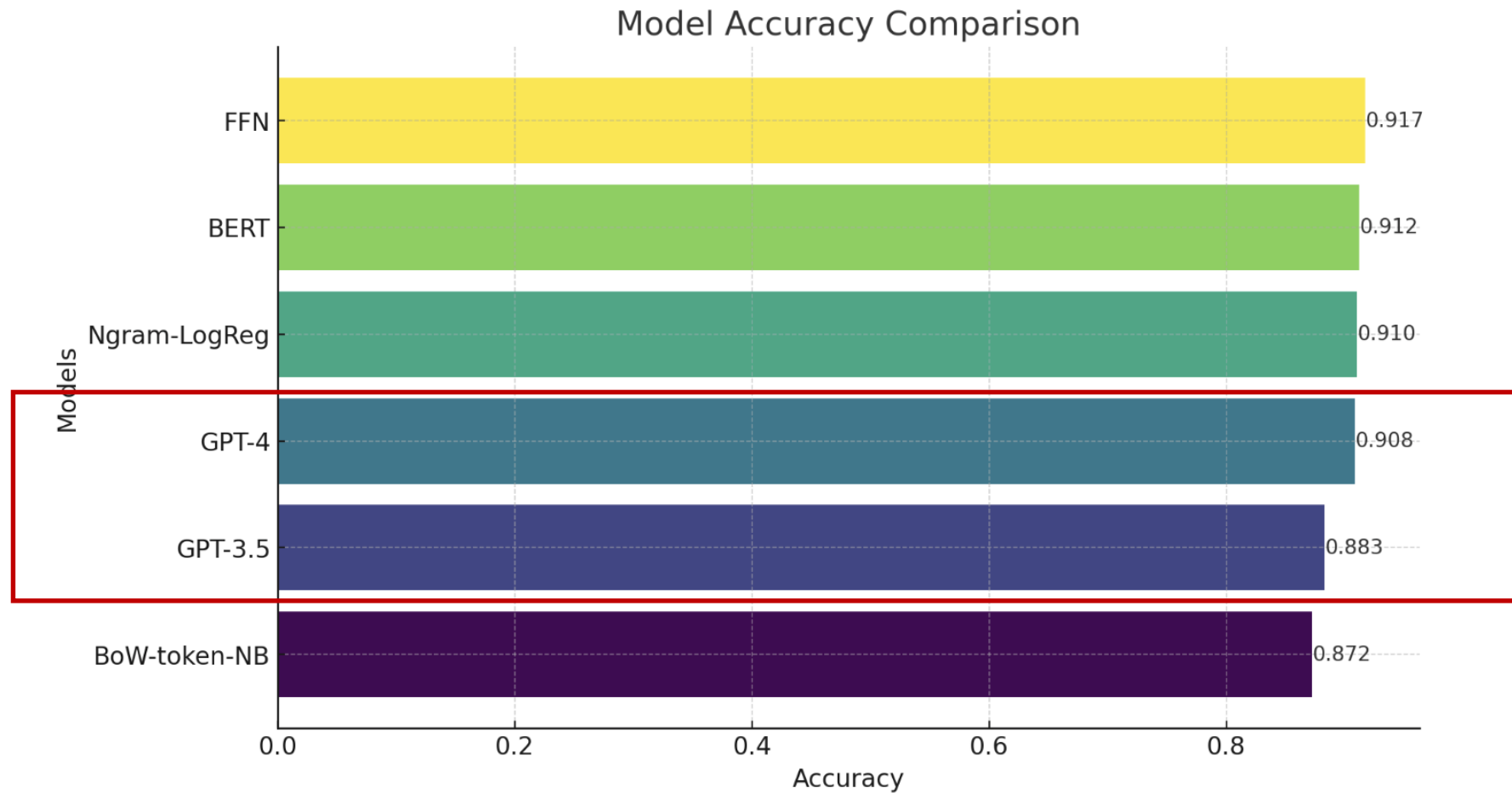


Benchmarking

Systematic Model Comparisons



Performance Metrics (genocide data only)



Annotation Overview

Genocide Transcript
Corpus

Reddit PTSD

Counseling
Conversations

Incel Dataset

ALREADY
ANNOTATED

1300 samples

1300 samples

300 samples
(only test data)

Annotation Pilot

How do you self-soothe? Tw: childhood sexual abuse & neglect Long story short, trauma the sexual abuse happened around 4-5 years of age and the emotional neglect went on for over a decade after. I have amnesia from the sexual trauma, but am currently dealing with crippling night terrors that are confusing me as to what I thought happened. I don't know if they're flashbacks, I know they're dreams, but they're traumatic in themselves because of the disgusting images I'm left with when I wake up. It's horrifying and overwhelming. I recently made huge headway in therapy and have finally learned to stop dissociating/going numb, something I've done for my entire life. Now that I can feel, I'm drowned in emotion, sadness, anger, hurt, but that's good because I'm finally really feeling everything. It's the not being able to calm myself down and help myself feel safe again that's the problem. I'm going to see a psychiatrist to see if I can get meds for the chronic nightmares (it's been an entire year now), but in the meantime I don't know how to calm myself when I'm emotionally overwhelmed. No one taught me how to properly soothe myself and all I've ever known is resorting to numbness. So here's my question, friends: how do you self soothe when you're overwhelmed and can't stop sobbing? How do you take care of yourself and help yourself feel safe? Thank you for reading~

Does this text contain a traumatic event? Click on "trauma" and highlight the traumatic event or on "uncertain" if you are uncertain. Skip if there is no such event. Traumatic events are defined as "exposure to actual or threatened death, serious injury, sexual violence, or severe mental abuse," whether directly encountered or witnessed. It also counts as a traumatic event if something like that has happened to a close family member or friend.

- ☒ trauma
- ☐ uncertain

Move backward

Move forward

Figure 7: Interface of the Span Annotation Task.

Annotation Pilot: “UNCERTAIN”

"It's screamed out in a whisper with hands clinched, teeth shown and the jaw locked tight. Anger runs with blood through the veins. But all this self medicating can't dissolve it. Neither will self inf

**Instructions
were adjusted
accordingly**

"couldn't graduate wi

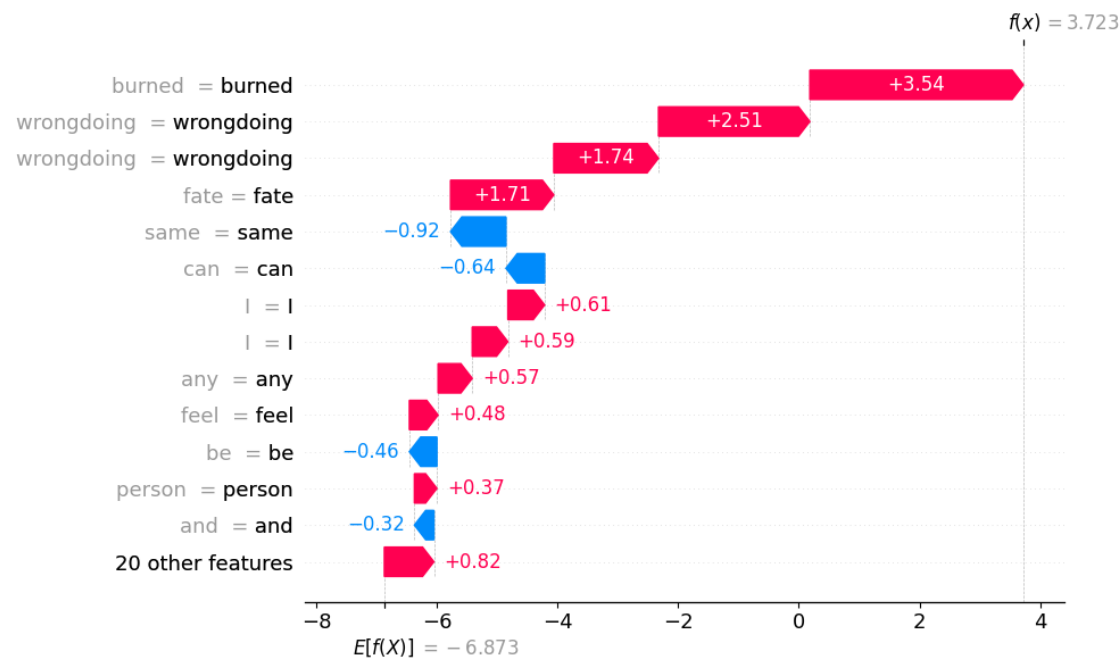
"falling into a depres. I just need help."

"My coworkers are making false statements about me"

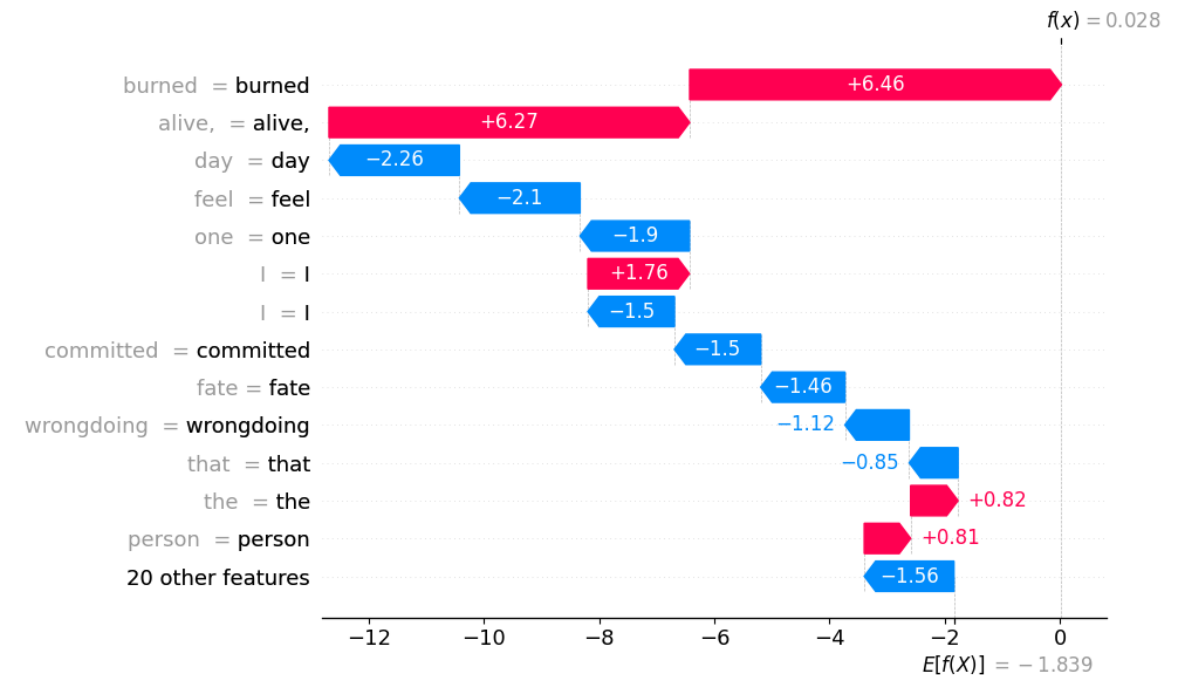
"I have severe anxiety and have tried everything."

XAI Results: Shapley Value Explanations

I can feel that the person committed any wrongdoing would be burned alive, and I would also see that one day if I committed any wrongdoing I would experience the same fate.



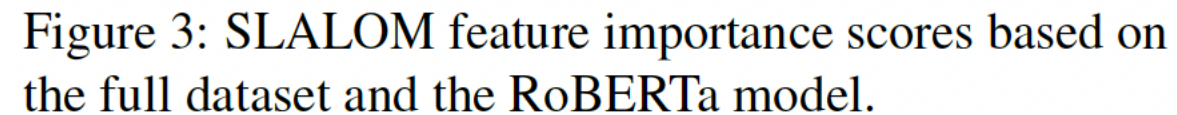
BERT



GPT-4

SLALOM

(Leemann et al., 2024)



XAI Results: Concept Learning

- Concept Learning in NLP
 - Algorithm extracts general concepts from specific text examples, instead of considering individual features only (Kim et al., 2018, Poeta et al., 2020).
- Concepts can be annotated in the data or discovered through clustering (e.g., k-means) of latent representations (e.g., embeddings).

TRIGGER WARNING

Concept 2

some cows were wounded.
 or diarrhoea .
 supply themselves with food.
 so itchy everywhere .
 bullet in the head;
 those various gunshots .
 once I was wounded .
 , one hit me in
 three bursts of gunfire .
 themselves from the bullet s.
 to work I kept crying
 and killed animals for wedding
 the gunshots and we were
 I even saw dead bodies
 I cry every night.

(a) firearms, physical injuries

Concept 4

and when he attacked me
 chief, was very cruel
 I was punished that way
 He pressed me against
 His disappearance was very
 painful
 Bou Meng was tortured for
 who tortured me was Si
 and then my eyes would
 olded me for being blinded
 so I had him buried
 , they stopped beating me
 who tore the child away
 all the beatings that
 They started beating me,
 task of killing people.

(b) torture, abuse

Concept 6

long you fell unconscious .
 falling into the ground.
 another place two bodies ,
 them were lying on the
 weapon in my mouth.
 I started freezing, and
 up the dead bodies and
 us drowned in the river
 a lot of dead and
 people who perished there.
 children die of hunger,
 then we all got stuck
 people and throwing their bodies
 her sister burned to death
 who died of hunger,

(c) death, motionless bodies

Concept 7

December he called me and
 my husband called cadres
 sometimes he called me to
 his phone call because he
 or called me and then
 was called Lucia, Ruk
 know what happened to Ph
 man called Rukara went
 since I was busy looking
 school was called Hasan Ve
 really is still in my
 one called me up and
 my wife asked them what
 tell you exactly when this
 It arrived in Kosovo Pol

(d) communication, asking questions (non-traumatic)

Figure 1: Examples of Concepts Discovered on the GTC dataset for the RoBERTa model: (a)-(c) Trauma related concepts, (d) non-trauma related concept

GTC: Concept 4

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(a) torture, abuse

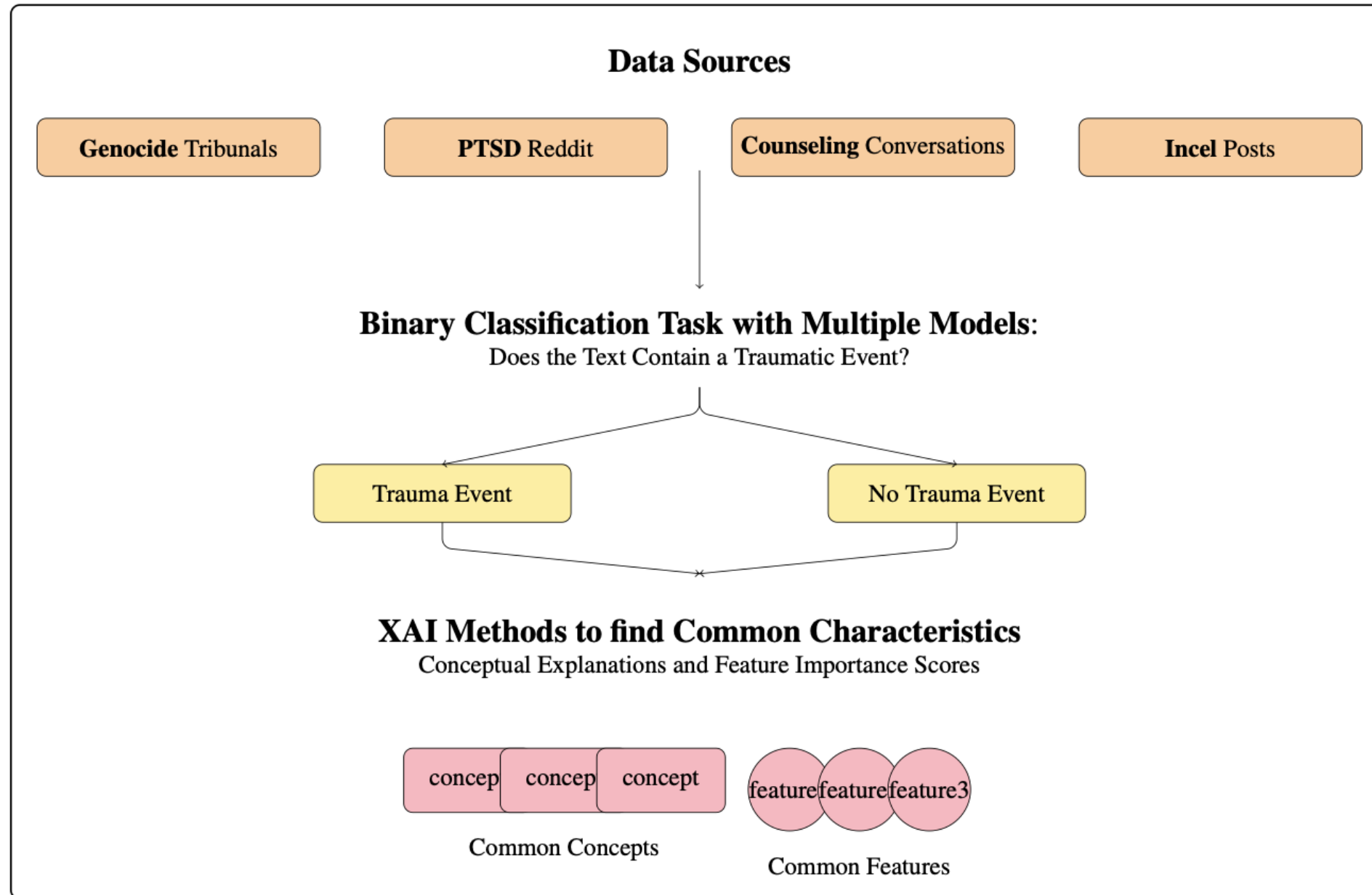
PTSD: Concept 9

extremely frequent flashbacks the
 me bad. The flashbacks
 When I was molested
 have vivid flashbacks. All
 about flashbacks. I
 after i was sexually assaulted
 young child, was sexually
 having nightmares and
 flashbacks
 repressed memories are a
 because I have flashbacks several
 always thought the memories
 of scolding via email
 like I was abused.

(b) flashbacks,
abuse**Counseling: Concept 9**

I was violently raped by
 got pregnant by my boyfriend
 my baby mother. She
 my children's father left
 I saw my mother cheating
 I was raped by multiple
 My girlfriend was abused as
 I got raped by my
 I just lost my mom
 teenager. My entire family
 I was raped repeatedly when
 My grandma and brother both
 parents injured my brother,
 , my husband mentally abused
 My mother has Alzheimer's

(c) rape, pregnancy



Takeaways

- Transformer models offer strong performance and generalization, though simpler models still perform well in-domain.
- Zero-shot performance by GPT-4 lags behind fine-tuned models.
- While certain features of trauma are context-specific, there are also universal elements across different experiences.
- Certain types of traumatic events—notably mental abuse—are particularly challenging to classify due to their less defined nature and greater variability
-> need for clear definitions and enhanced model performance.

Thank you very much!

Comments? – Critique? – Ideas?

Happy to connect and discuss

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