

Introduction

- Several datasets have been collected facilitating the development of coreference resolution systems;
 - Application to other domains and languages requires further data collection;
- To collect new data we need: (1) **annotators**, (2) **guidelines**, (3) **annotation tool**.

Crowdsourcing opens new possibilities, **BUT**:

- (1) there is **little agreement** on coreference guidelines;
- (2) annotation tools are either **too complicated or not open-sourced**.

ezCoref Annotation Tool

Open sourced

Integration with crowdsourcing platforms

Crowdsourcing Friendly UI

coref

← Previous Target Next Target →

Currently Annotating Entity 0

0 Alice was beginning to get very tired of sitting by
 1 0 her sister on 2 the bank and of having
 3 nothing to do: once or twice 0 she had peeped
 into 4 the book her sister was reading (...)

Submit

Tutorial

- ✓ Interactive
- ✓ Customizable
- ✓ Validated by **70+ AMT** annotators

“Absolutely beautiful, intuitive, and helpful. Legitimately the best one I’ve ever seen in my 2 years on AMT! Awesome job”

Reannotation Study

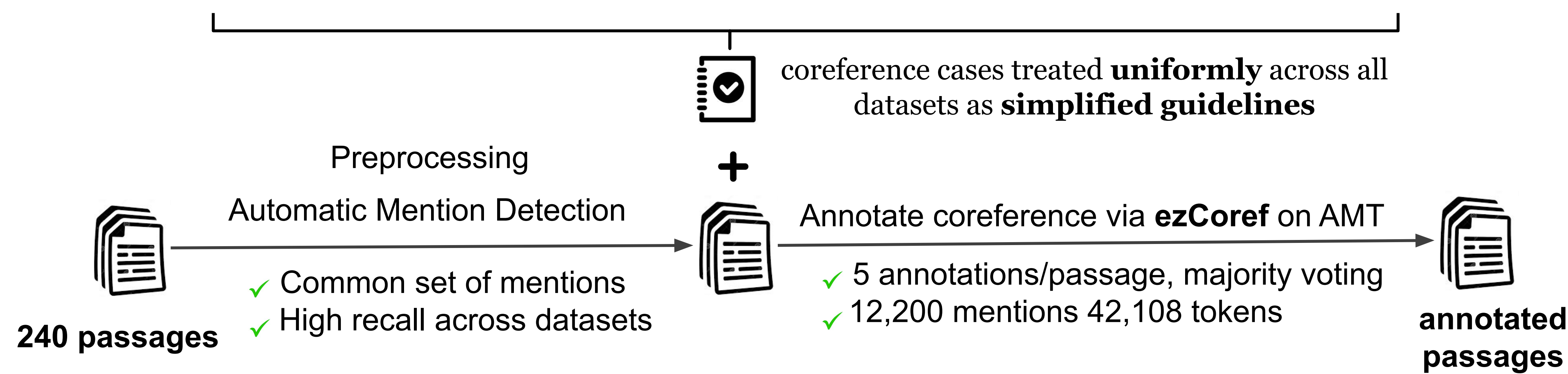
OntoNotes (Hovy et al., 2006) **GUM** (Zeldes 2017) **ARRAU** (Uryupina et al., 2019) **LitBank** (Bamman et al., 2020) **QuizBowl** (Guha et al., 2015) **Phrase Detectives** (Chamberlain et al., 2016) **PreCo** (Chen et al., 2018)

Linguistic Experts

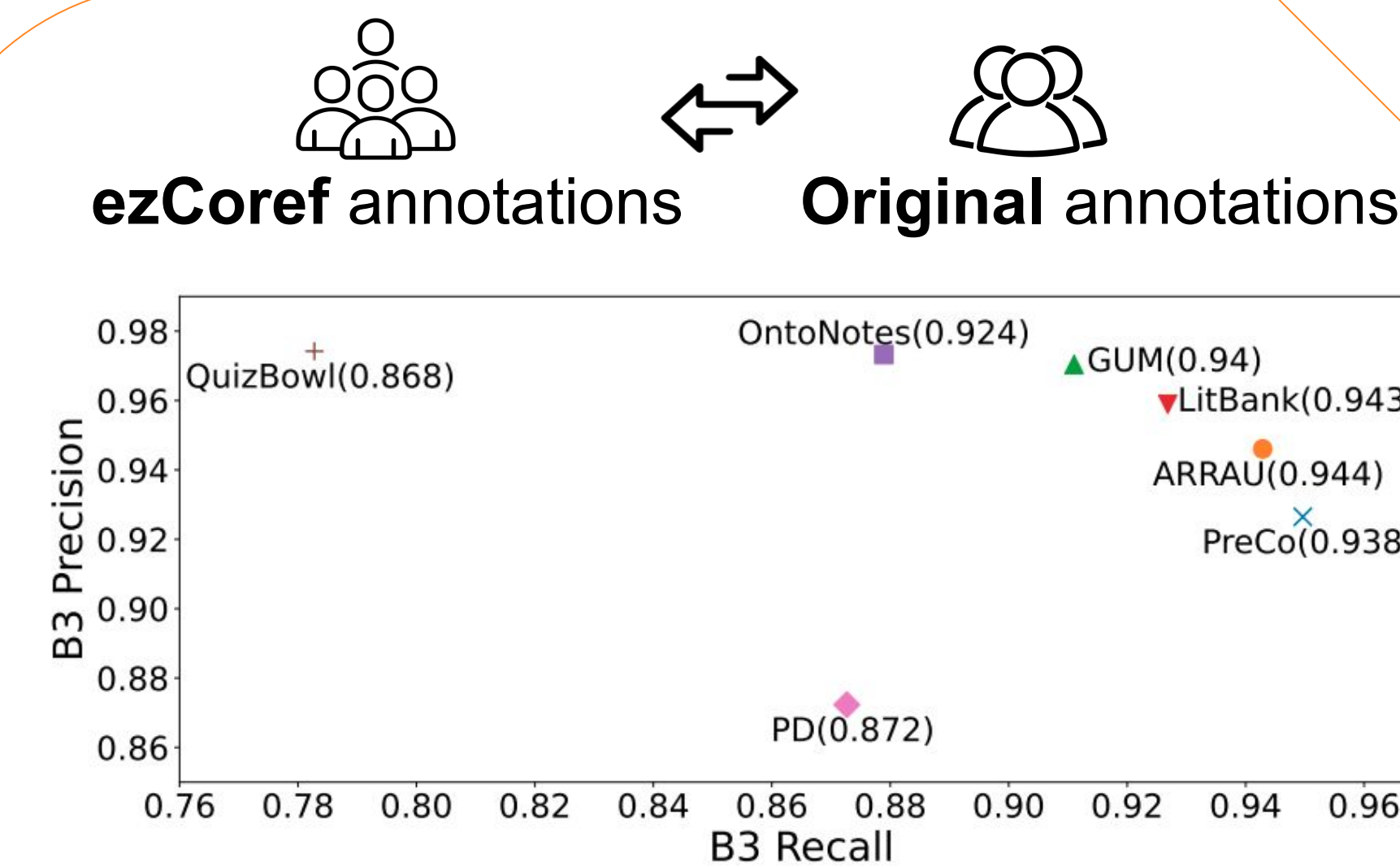
Domain Experts

Crowd

News Biographies Weblogs Fiction Quizzes Opinions Wikipedia



Analysis



- High Agreement with expert datasets**
 - Pronouns, Named Entities
 - Appositives (**GUM**)
 - Generic Mentions (**ARRAU** and **GUM**)

[Fuad Basya], [spokesman for the Indonesian military]

Kidder is putting **[brokers]** through a training course [...]. However, skeptics caution [...] **[brokers]** and investment bankers looks great only on paper.

- Low precision with Phrase Detectives**
 - split-entities in **PD** annotations

Not long after **[a suitor]** appeared [...] and the miller [...] betrothed his daughter to **[him]**. But the girl did not care for **[the man]**(...) she could not look at **[him]** nor think of **[him]**.

- Low recall with QuizBowl**
 - cataphora

[One character in this work]; is forgiven by **[his]** wife (...). In addition to **[Stiva]** (...), **[another character in this work]** (...) had earlier failed in **[his]** courtship of Ekaterina Shcherbatskaya.

ezCoref annotations ↔ ezCoref annotations

Fiction	Bio	Opinion	Web	News	Wiki	Quiz
72.6	72.4	69.5	65.9	62.3	61.8	59.7

Domain-wise Inter Annotator Agreement (B3 scores)

- High agreement on fiction**
 - abundant in pronouns, familiar childhood stories

A Wolf had been gorging on an animal **[he]** had killed, when suddenly a small bone in the meat stuck in **[his]** throat and **[he]** could not swallow it. **[He]** soon felt a terrible pain in **[his]** throat (...) **[He]** tried to induce everyone (...)
- Low agreement on QuizBowl**
 - cataphora
 - world knowledge

Another character in this work rejects **[Ekaterina]** before (...) moving to St. Petersburg. For 10 points name this work in which **[Levin]** marries **[Kitty]**.

Deviations: Generic Pronouns

ezCoref annotations = ezCoref annotations ≠ Original annotations

You have the right to conceal **your** coup intentions, because **we** may rat on **you**.
OntoNotes

[You] have the right to conceal **[your]** coup intentions, because **[we]** may rat on **[you]**.
ARRAU

[You] have the right to conceal **[your]** coup intentions, because **[we]** may rat on **[you]**.
ezCoref annotations

Takeaways

- Coreference annotation remains a difficult task with genuine ambiguities (Plank, 2022)
 - Disagreement for mention **[it]** among ezCoref annotators
 - Consistent with Szkolczai (2016)'s literary analysis

[Fog] everywhere. **[Fog]** up **[the river]**, where **[it]** flows among green aits and meadows; **[fog]** down **[the river]**, where **[it]** rolls defiled among the tiers of shipping and the waterside pollutions of a great (and dirty) city.
 —from *Bleak House* by Charles Dickens
- Reasonable quality annotations are already achievable even without extensive training.
- Deviations of ezCoref annotations from original annotations suggest interesting cases which should be revisited by researchers when curating unified annotation guidelines.