Pixie

Preference in Implicit and Explicit Comparisons

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Motivation

Comparisons in User Generated Text

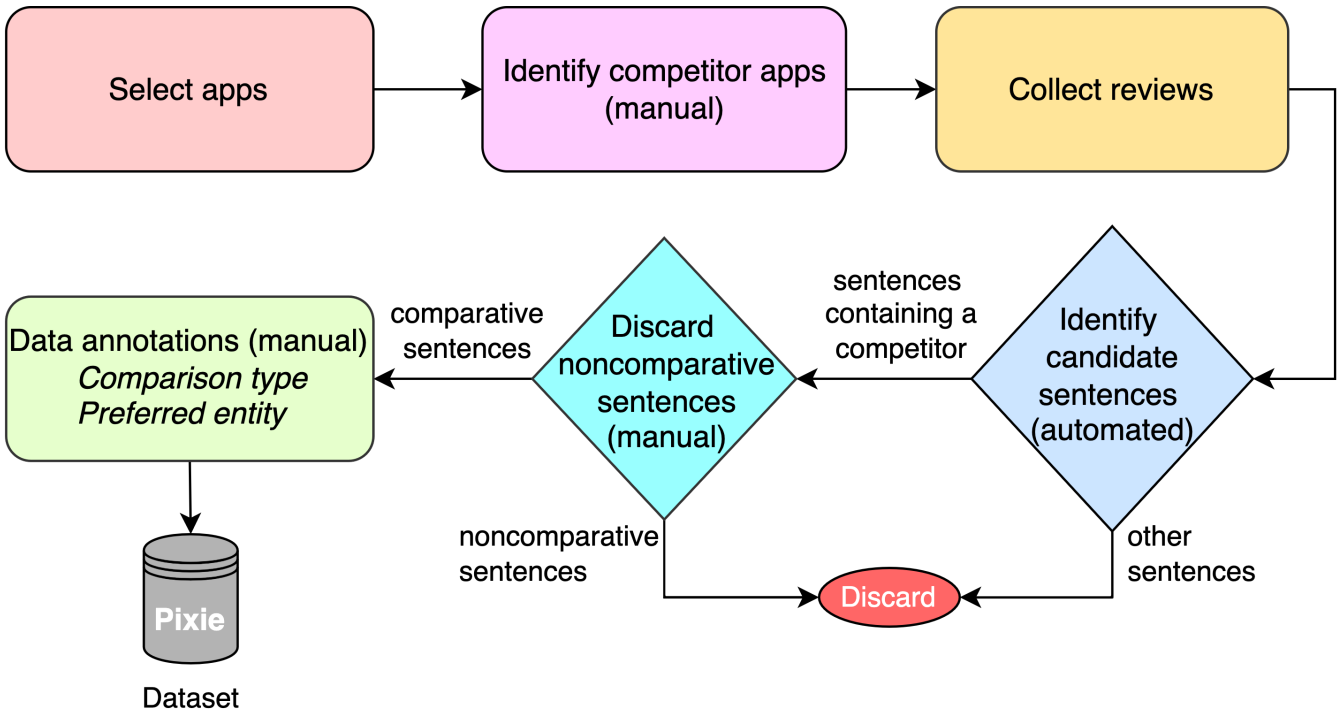
[redacted]
★½
"United is better than American airlines."

[redacted]
★★★½
"Bye Uber, hello Lyft!"

[redacted]
★★★★★
"Beats the pants off Pandora!"

Dataset

Dataset Creation Methodology



Data Annotations

A *comparison* can be,

- **Explicit**
- **Implicit**

A *preferred entity* can be,

- **Current** app
- **Other** app
- **None**

Pixie Comparative Sentences

[redacted]
★½
"United is better than American airlines."

[redacted]
★★★½
"Bye Uber, hello Lyft!"

[redacted]
★★★★★
"Beats the pants off Pandora!"

Pixie Comparative Sentences (Annotated)

[redacted]
★½
*"**United** is better than **American airlines.**"*

App reviewed: **United**

Comparison: **Explicit**

Preferred entity: **Current**

App reviewed: **Uber**

Comparison: **Explicit**

Preferred entity: **Other**

[redacted]
★
*"Bye **Uber**, hello **Lyft**!"*

[redacted]
★★★★★
*"Beats the pants off **Pandora**!"*

App reviewed: **Spotify**

Comparison: **Implicit**

Preferred entity: **Current**

Dataset Distribution

Preferred Entity	Comparison Type		Total
	Implicit	Explicit	
CURRENT	1910	2097	4007
OTHER	2199	1069	3268
NONE	758	857	1615
Total	4867	4023	8890

The Task

Given a sentence,

$$s = (w_1, w_2, w_3, ..., w_n)$$

that contains either an explicit or an implicit comparison between two entities, our goal is to identify the preferred entity.

Masking

- Limited app pairs restrict generalizability
- Mask compared entity mentions
  - current_app, and
  - other_app

	Original sentence	Masked sentence
1	***CNN*** should leave journalism to the pros at ***Fox news***.	***<current_app>*** should leave journalism to the pros at ***<other_app>***.
2	***This*** is a great game just like ***Temple run***	***<current_app>*** is a great game just like ***<other_app>***

Experiments and Results

Experiments

- Traditional machine learning approaches
  - SVM, Random Forest, AdaBoost
- Transformer-based approaches
  - BERT, ALBERT, DeBERTa, and XLNET
- Prior work
  - ED-GAT [1] (SOTA)

[1] Nianzu Ma, Sahisnu Mazumder, Hao Wang, and Bing Liu. 2020. *Entity-aware dependency-based deep graph attention network for comparative preference classification*. In Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics, 5782–5788.

Results

Approach	Model	Weighted Average		
		Precision	Recall	F1-score
Prior Work	ED-GAT	74.44	73.68	73.99
Traditional ML	AdaBoost	63.80	64.62	64.07
	Random Forest	68.97	68.62	66.72
	SVM	72.19	73.00	71.86
Transformer-Based	BERT	79.26	79.70	79.37
	DeBERTa	83.15	83.63	83.34
	ALBERT	81.87	81.89	81.88
	XLNet	80.67	81.33	80.77

Model Predictions and User Ratings

- Group sentences based on preferred entity and compare user ratings
- The results are consistent with the user ratings

Data	Preferred Entity			
	Current	None	Other	
Entire Pixie dataset	4.656	3.321	1.993	Ground truth
Test set	4.665	3.292	1.945	Ground truth
Test set	4.608	3.139	1.991	Model predictions

Cross Dataset Performance

- Pixie vs. CompSent-19 [2]
- CompSent-19 is the largest existing dataset for preference classification

Fine-tune	Test	Precision	Recall	F1-score	Accuracy
CompSent-19	Pixie	65.46	59.89	59.23	59.89
Pixie	CompSent-19	65.19	65.00	63.31	65.00

[2] Alexander Panchenko, Alexander Bondarenko, Mirco Franzek, Matthias Hagen, and Chris Biemann. 2019. Categorizing comparative sentences. In Proceedings of the 6th Workshop on Argument Mining, pages 136– 145, Florence, Italy. Association for Computational Linguistics.

Conclusion

Conclusion

- Pixie is the largest annotated dataset for preference classification
- Pixie includes overlooked comparative sentences, such as
  - Indirect comparisons
  - Implicit comparisons
- Pixie provides better coverage for comparative sentences
- Pixie annotations are consistent with the user ratings
- Models fine-tuned on Pixie outperform the SOTA (ED-GAT)

Thank you!

Please send your feedback/queries to *ahaque2@ncsu.edu*
Project Repository: *https://github.com/ahaque2/Pixie*