An Italian Verb Lexicon for Sentiment Inference

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Abstract

Verb-centered sentiment analysis provides a fine-grained perspective on the polar impact a situation has on its participants. It is good for a person to be honored for e.g. some achievement and we know in advance that such an achievement is expected to have positive polarity. Also, there is a positive relation between the honorer and the honoree. We introduce an Italian verb lexicon that specifies the polar relations a verb expresses and the effects and expectations that the roles of the verb bear.

Keywords

Sentiment inference, polarity lexicon, verb-based sentiment analysis,

1. Introduction

A sentence is not just positive or negative, it moreover sheds a (polar) light on its participants. Given a sentence like *I mourn my freedom* (It. Piango la mia libertà), a negative effect is cast on the subject and we expect a positive filler of the direct object. Furthermore, we might conclude that the subject is in favour of the object. We have created an Italian verb lexicon comprising 307 verbs with up to 3 frames per verb in order to enable such kind of inferences. Such a lexicon might be useful for stance detection or even for lexicon induction (e.g. from the object expectation of *mourn* we can conclude that *libertà* is a positive concept).

In this short paper, we discuss the ingredients of our lexicon both from a practical and theoretical point of view.

2. Related Work

There are quite a number of approaches to Italian sentiment analysis, be it for social media [1], stance detection [2] or in the context of aspect-based sentiment analysis [3]. Recently, deep learning approaches have conquered the field, but there are lexicon-based approaches as well. To the best of our knowledge, our lexicon is the first for Italian sentiment inference based on a verb resource. In the past, we have created resources and prototypes e.g. [4], [5] and [6] for German sentiment inference[1] and we

[1]For a German demo see: https://pub.cl.uzh.ch/demo/stancer/index.py.

have started to augment this to the other national Swiss languages: French and Italian. We have also applied our model to gender profiling in order to find out how male or female denoting nouns are distributed in the context of polar verbs [7]. For English, various approaches for sentiment inference are available, see [8], [9], but also [10] and [11]. Also LLMs like ChatGPT are capable of doing it, see [12].

3. Theoretical Framework

A polar verb often expresses a polar relation like *in favour* or *against*. Given the sentence *Lei lo critica* (Eng. She criticizes him), we conclude that the referent of *lei* (Eng. she) is (in a situation-specific way) against the referent of *lo* (Eng. him). We can fix this directed relation by qualifying the subject (the agent) of the verb as the source and the direct object (patient or theme) as the target. We do not claim that all of these relations are intentional, i.e. express a deliberate polar opinion of the source towards the target. Our ultimate goal is to enable (transitive) sentiment inference on the basis of our lexical specifications. Take the sentence *She is against the contract because it prevents a solution*. From this we can directly learn that a) she is intentionlly against the contract and that b) the contract is (non-intentionally directed) against a solution. Only the presence of b) allows us to draw the transitve inference that she is in favour of a solution. The underlying rule is: if X is against Y and Y is against Z, then X is in favour of Z. Thus, the source and target can be animate or non-animate. If it is animate, than the relation might indicate an intentional polar relation originating from the source towards the target. A non-animate source just counts as a cause.

Some polar verbs do not cast a polar relation, but yield a positive or negative perspectivation. For instance, the intransitive usage of the verb *soffrire* (Eng. suffer) like in *Lui soffre* (Eng. He suffers) just tells us that the referent

of *lui* is experiencing a negative effect. A polar effect is a positive or negative connotation associated with a verb role (comparable to *good/bad for* effects of [13]). A verb expressing a polar relation might also cast effects, but not in any case. In *Lei lo punisce* (Eng. she punishes him), besides the negative relation there is also a negative effect casted onto *lo* (Eng. him). However in *Lui soffre del suo capo* (Eng. he suffers from his boss) although a negative relation from *Lui* towards *suo capo* holds, there is no negative effect on it. This becomes even clearer if we replace the animate filler by a non-animate one like in *Lui soffre per questa situazione* (Eng. He suffers from the situation). It makes no sense to claim a negative effect on the situation.

In sum: our annotation scheme for polar verbs specifies which roles of a verb do have a positive or negative (directed) relation given an affirmative usage of the verb. Also, we specify whether a verb casts a positive or negative effect on its roles.

So far in our discussion, we have used dependency labels or grammatical functions in order to refer to the roles of a verb. We claim, for instance, that the subject of *criticare* (Eng. criticise) is against the direct object. Even if we assume some normalization, namely passive voice normalization, this might lead to problems. In both cases, *The famous chef cooks* and *The rice cooks* there is a subject, but in the first case it realises an agent in the second a theme. Although in principle semantic role labelling (SRL) might be regarded a better basis for such specification, we have found in [14] that at least for German the available SRL approaches are not suited. Among others, the problem is that the agent role is assigned not exclusively to animate objects (or metonomically used inanimate objects) but also to plain physical objects. For example, the semantic role labeller InVeRo [15] using VerbAtlas[2] assigns the theme role to both (German) subjects: a) *Vergeltung droht ihm* (Eng. retribution threatens him) and b) *Er (animate) droht ihm* (Engl. He threatens him). Only in b) a negative relation should hold (i.e. He against him). For our German model, we sticked with dependency labels and specified coarse-grained selectional restrictions for each verb frame. We then used an animacy classifier, see [16], in order to select the right verb frame. For Italian, the quality of semantic labeling has to be evaluated in order to come to a final decision about the role inventory. This is future work.

Detecting polar relations and effects in sentences on the basis of a lexicon (and a parser) might be regarded antiquated in the age of deep learning. However, there is no need to learn these patterns from annotated data. If the trigger conditions of a verb (frame) are met, then the relations and effects can safely be asserted. Nevertheless, lexicon-based approaches suffer from out-of-vocabulary

(oov) cases. Here deep learning (e.g. word embeddings) might actually be useful, since the similarity of oov verbs to verbs that have been seen in the training phase could be exploited.

4. Corpus: Data Format

We have created a json version of our resource and placed it at Zenodo[3]. For each of the 307 verbs[4] a dictionary is given with the verb lemma, all (subcategorization) frames, the verb polarity, the relations expressed, the effects and expections and one or more sample sentences. For instance the verb *interrompere* (Eng. e.g. cut off) (only one frame is shown) is described in Fig. 1. The English

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{"verb": "interrompere",
"frame": ["Subj", "Obj"],
"polarity": "NEG",
"relation":[("Subj","against","Obj")]
"effects": [("Obj", "neg")],
"expectations": [],
"example": "Hanno interrotto gli aiuti
          umanitari"}
```

Figure 1: Sample entry for *interrompere*

translation of the sample sentence is *They have cut off humanitarian aid.* According to the verb frame, a subject and an object are required. Given this, a negative effect is cast on the object (humanitarian aid) and an *against* relation is drawn to the object. In the case of non-overt pronouns the arc of the finite verb is annotated, see the *against* relation in Fig. 2.

Some roles of a verb seem to carry a polar expectation. For instance if we hear that somebody is suffering from something, we immediately know that this something is (regarded as) negative. We have integrated expectations in our lexicon, since it might be useful for e.g. lexicon induction.

5. Further Details and Restrictions

First of all, verb disambiguation cannot be totally replaced by subcategorization checks. Take an English example: the two sentences a) *he won the race* and b) *he won the trophy* have the same subcategorization frame (also VerbAtlas assigns the same semantic roles), but the (polar) meaning is different due to verb ambiguity. In a) *he* receives a positive effect, but has no relation to the race, while in b) we can conclude that *he* is in favour of
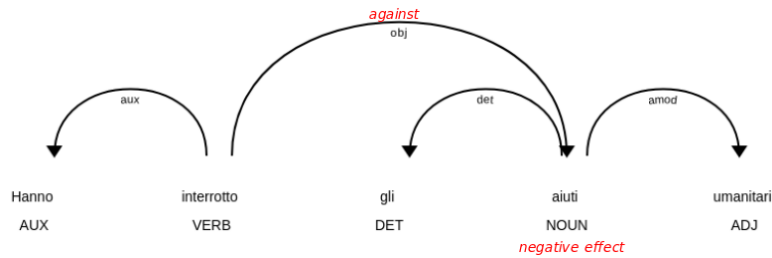

Figure 2: Annotated example (Spacy parse tree)

the trophy. This is to say that using our resource in a system demands additional functionalities.

Some verbs need further checks for them to get triggered. Take for instance the verb *impedire* (Eng. impede). If someone impedes something negative (a struggle), this is good of her (a positive effect and negative relation), but if it is positive (e.g. a solution), it is bad of her (a negative effect and - again - a negative relation). We can determine polar restrictions on the basis of a traditional polarity lexicon. But sometimes also sentiment composition might be needed as in *He stopped the unjustified promotion of the minister*. Here *unjustified promotion* is negative according to a simple composition rule that says that a negative adjective followed by a positive noun gives a negative phrase. Our manually created Italian polarity lexicon[5] (3,247 lemmas) can be used for such sentiment composition. Nouns and adjectives have been specified on the basis of the appraisal theory [17]: a word might be positive or negative wrt. to one of three dimensions: moral, emotion, appreciation. This allows even to distinguish between cases where a negative effect depends on the appraisal type of the filler. *sick* and *cheating* are both negative, but the former is an appreciation while the latter is morally negative adjective. While the sentence *she admires her sick colleague* proves that she is compassionate, the sentence *she admires her cheating colleague* makes her a morally questionable person. Table 1 shows the distribution of word and polarities in our polarity lexicon.

PoS	positive	negative
noun	370	1242
adjectives	421	1060
adverbs	76	78

Table 1
Polarity Lexicon: distribution of word polarities

Many Italian polarity lexicons[6] specifying the word level polarity of nouns, adjectives and verbs are available.

However, there is no fine-grained lexicon at the verb level comparable with ours.

6. Conclusion

In this paper, we have described an Italian verb lexicon and the theory behind it. The lexicon specifies for each Italian verb the underlying relation (in favour or against) and for each verb argument the effects and expectations (if any). The resource has been released together with a traditional polaritiy lexicon (nouns, adjectives). The verb lexicon can be used for sentiment inference, finding out who is in favour of or against who or what. This is useful e.g. for the profiling of political parties: are they in favour or against some topic. Also, the polar perspective which we call effects can be determined: to answer the question whether a text is positive or negative towards an animate or inimate object. This enables to determine the stance of a text author, but also can be used in order to find out how a person or a product is framed e.g. in a particular text or text collection.

Acknowledgements

References

[1] F. Bianchi, D. Nozza, D. Hovy, FEEL-IT: Emotion and sentiment classification for the Italian language, in: Proceedings of the Eleventh Workshop on Computational Approaches to Subjectivity, Sentiment and Social Media Analysis, Association for Computational Linguistics, Online, 2021, pp. 76–83. URL: https://aclanthology.org/2021.wassa-1.8.

[2] M. Moraca, G. Sabella, S. Morra, Uninastudents @ sardistance: Stance detection in italian tweets

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[5]https://zenodo.org/record/8194906
[6]https://www.ai-lc.it/en/affective-lexica-and-other-resources-for-italian

- task a (short paper), EVALITA Evaluation of NLP and Speech Tools for Italian - December 17th, 2020 (2020). URL: https://api.semanticscholar.org/CorpusID:229292804.

[3] P. Basile, D. Croce, V. Basile, M. Polignano, et al., Overview of the evalita 2018 aspect-based sentiment analysis task (absita), in: EVALITA Evaluation of NLP and Speech Tools for Italian, CEUR, 2018, pp. 1–10.

[4] M. Klenner, S. Tron, M. Amsler, N. Hollenstein, The Detection and Analysis of Bi-polar Phrases and Polarity Conflicts, De Gruyter, 2015, pp. 161–172. URL: https://doi.org/10.5167/uzh-99629.

[5] M. Klenner, M. Amsler, Sentiframes: A resource for verb-centered German sentiment inference, in: Proceedings of the Tenth International Conference on Language Resources and Evaluation (LREC 2016), European Language Resources Association (ELRA), Paris, France, 2016.

[6] M. Klenner, D. Tuggener, S. Clematide, Stance detection in Facebook posts of a German right-wing party, in: LSDSem 2017/LSD-Sem Linking Models of Lexical, Sentential and Discourse-level Semantics, 2017. URL: https://doi.org/10.5167/uzh-136567.

[7] M. Klenner, Sentiment inference for gender profiling, in: Proceedings of the 4th Conference on Language, Data and Knowledge, in press, Viena, Austria, 2023.

[8] A. Neviarouskaya, H. Prendinger, M. Ishizuka, Semantically distinct verb classes involved in sentiment analysis, in: IADIS AC (1), 2009, pp. 27–35.

[9] L. Deng, J. Wiebe, Sentiment propagation via implicature constraints, Meeting of the European Chapter of the Association for Computational Linguistics (EACL-2014) (2014).

[10] H. Rashkin, S. Singh, Y. Choi, Connotation frames: A data-driven investigation, in: Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers), Association for Computational Linguistics, Berlin, Germany, 2016, pp. 311–321. URL: https://aclanthology.org/P16-1030. doi:10.18653/v1/P16-1030.

[11] K. Park, Z. Pan, J. Joo, Who blames or endorses whom? entity-to-entity directed sentiment extraction in news text, in: Findings of the Association for Computational Linguistics: ACL-IJCNLP 2021, Association for Computational Linguistics, Online, 2021, pp. 4091–4102. URL: https://aclanthology.org/2021.findings-acl.358. doi:10.18653/v1/2021.findings-acl.358.

[12] B. Zhang, D. Ding, L. Jing, How would stance detection techniques evolve after the launch of ChatGPT?, CoRR abs/1207.0016 (2023).

[13] L. Deng, Y. Choi, J. Wiebe, Benefactive/malefactive event and writer attitude annotation, in: Proceedings of the 51st Annual Meeting of the Association for Computational Linguistics (Volume 2: Short Papers), Association for Computational Linguistics, Sofia, Bulgaria, 2013, pp. 120–125. URL: https://aclanthology.org/P13-2022.

[14] M. Klenner, A. Göhring, Semantic role labeling for sentiment inference: A case study, in: Proceedings of the 18th Conference on Natural Language Processing (KONVENS 2022), KONVENS 2022 Organizers, Potsdam, Germany, 2022, pp. 144–149. URL: https://doi.org/10.5167/uzh-220537.

[15] S. Conia, R. Orlando, F. Brignone, F. Cecconi, R. Navigli, InVeRo-XL: Making cross-lingual Semantic Role Labeling accessible with intelligible verbs and roles, in: Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing: System Demonstrations, ACL, Online and Punta Cana, Dominican Republic, 2021, pp. 319–328. URL: https://aclanthology.org/2021.emnlp-demo.36. doi:10.18653/v1/2021.emnlp-demo.36.

[16] M. Klenner, A. Göhring, Animacy denoting german nouns: Annotation and classification, in: Proceedings of the Language Resources and Evaluation Conference, European Language Resources Association (ELRA), Marseille, France, 2022, pp. 1360–1364. URL: https://aclanthology.org/2022.lrec-1.145.

[17] J. R. Martin, P. R. R. White, Appraisal in English, Palgrave, London, 2005.

Appendix: Verbs and Frame Size (#)

verb	#frame	verb	#frame
abbandonare	2	abbassarsi	1
abbattere	2	abolire	1
abusare	1	accettare	1
accusare	2	adattare	2
adeguare	2	adempiere	1
adorare	2	affascinare	1
affaticare	2	affidare	2
affligere	2	affondare	1
aggravare	2	aggredire	1
agitare	2	aiutare	2
alimentare	3	alleare	2
alleviare	1	allontanare	3
amare	2	ammazzare	2
ammettere	1	ammirare	1
animare	1	annullare	2
apostrofare	1	applaudire	1
apprezzare	1	approfittare	2
approvare	1	arraffare	3
arrendersi	1	arrestare	1
arricchire	2	assalire	1
assaltare	1	assassinare	2
assicurare	2	attaccare	1
augurare	2	aumentare	1
autorizzare	1	avvantaggiare	2
battere	2	beneficiare	1
bloccare	2	bruciare	3
cacciare	2	calmare	2
cancellare	2	castigare	1
cedere	2	celebrare	1
cessare	1	chiudere	2
colpire	2	coltivare	1
combattere	4	condannare	1
confortare	2	congratularsi	1
conquistare	1	consacrare	2
conseguire	1	consentire	4
conservare	1	consigliare	2
consolare	2	contentare	2
contestare	2	contrastare	1
contribuire	1	convalidare	1
convincere	1	correggere	2
costare	2	costringere	2
crescere	1	criticare	1
curare	2	danneggiare	2
declinare	2	dedicare	2
deludere	1	denunciare	2
deplorare	1	desiderare	1
desistere	1	detestare	2
deviare	1	dibattersi	1
difendere	2	diffidare	2
dimenticare	2	dimettersi	1
diminuire	1	dimostrare	1
disgustare	2	dissimulare	2

verb	#frame	verb	#frame
distruggere	2	disturbare	1
divertire	3	domare	1
dubitare	1	eliminare	1
entusiasmare	2	esaltare	2
esaudire	1	escludere	3
espandere	1	espellere	1
esplodere	2	evolversi	1
facilitare	1	fallire	1
favorire	1	felicitarsi	1
ferire	2	festeggiare	1
forzare	2	fuggire	2
garantire	3	godere	2
ignorare	3	illuminarsi	1
imbrogliare	2	impedire	2
impegnarsi	1	imporre	2
incantare	2	incitare	1
incolpare	2	incoraggiare	3
indebolire	2	indignare	2
infrangere	2	ingannare	2
inquietare	2	integrarsi	1
intensificarsi	1	interessare	1
interrompere	2	invadere	1
irritare	1	isolare	3
ispirare	2	lacerare	2
lamentare	2	lasciare	1
liberare	2	licenziare	1
limitare	2	lottare	2
mancare	3	mantenere	1
mentire	2	meritare	2
migliorare	3	minacciare	1
modernizzare	2	molestare	1
moltiplicare	2	morire	1
nascondere	2	naufragare	1
negare	4	nuocere	1
nutrire	3	obbligare	2
occultare	2	odiare	1
offendere	2	offrire	5
onorare	2	opporre	2
ostacolare	1	pagare	2
patire	1	penalizzare	1
perdere	3	perdonare	2
perire	1	permettere	3
perseguitare	1	piacere	2
piangere	1	picchiare	2
precipitare	2	preoccupare	2
preservare	1	privare	2
privilegiare	1	progredire	1
promettere	1	promuovere	1
proteggere	2	protestare	1
provocare	1	punire	1
raccommandare	2	raddoppiare	1
rafforzare	2	rallegrare	2
rassicurare	2	ratificare	1
recuperare	1	regolare	1
resistere	2	respingere	1

verb	#frame	verb	#frame
ricompensare	1	riconoscere	2
ridere	2	ridurre	4
rifiutare	2	rimpiangere	1
rimproverare	3	rinchiudersi	1
ringraziare	1	rinnovare	2
rinunciare	1	riposare	2
rischiare	1	risentire	3
risolvere	2	risparmiare	1
rispettare	1	ristabilire	2
ritirare	3	riuscire	2
rivelarsi	2	rompere	4
rovesciare	2	rubare	3
sacrificare	2	salutare	1
salvare	3	sanzionare	1
sbagliare	3	sbarazzare	2
scappare	1	scatenare	2
schiacciare	2	scioccare	1
sciupare	2	scombussolare	1
scomparire	1	scompigliare	2
sconvolgere	1	scoppiare	2
scoraggiare	2	scordare	2
scuotere	2	sedurre	1
separarsi	1	sfidare	1
sfuggire	1	sgomberare	2
sgridare	1	smarrire	3
smentire	4	smettere	1
snobbare	2	soddisfare	1
soffrire	3	sopportare	1
sopprimere	1	sorridere	2
sospendere	1	sospettare	3
sottomettere	2	sottrarsi	1
sperare	1	spezzare	4
stancare	2	stigmatizzare	1
stimare	1	strappare	2
stravolgere	1	stuprare	1
subire	1	suggerire	1
suicidarsi	1	suscitare	1
temere	3	tormentare	1
tradire	2	trascinare	2
trascurare	2	trasgredire	1
truffare	2	turbare	1
ubbidire	1	uccidere	2
urtare	2	vantare	2
vegliare	1	vietare	1
vincere	1	violare	1