Legal argument mining on italian datasets

NLP 3-cfu Project Work

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Abstract

The abstract is very brief summary of your report. Try to keep it no longer than 15-20 lines at most. Write your objective, your approach, and your main observations (what are the findings that make this report worthwhile reading?)

Multiple models have been tried and tested for legal argument mining on English language datasets but similar work is lacking for Italian language datasets. We work to transpose the techniques currently tested to a corresponding italian dataset and test new models and techniques to overcome the issues inherent with the italian dataset, such as smaller size and higher imbalance. We analyze the results of the newly tested models.

1 Introduction

The Introduction is an executive summary, which you can think of as an extended abstract. Start by writing a brief description of the problem you are tackling and why it is important. (Skip it if this is an assignment report).

Then give a short overview of known/standard-/possible approaches to that problems, if any, and what are their advantages/limitations.

The study of argumentation in legal contexts has its roots in logic, philosophy, and linguistics, as it studies how different claims and opinions are proposed, debated, and evaluated, considering their relations and inter-dependencies. The legal domain offers a natural scenario for the application of different argument models as well as novel machine learning and natural language processing techniques in order to perform legal reasoning. Existing literature has already evaluated multiple models and variants on english language Datasets like Demosthenes (Grundler et al., 2022).

An italian language dataset suitable to work on legal argument mining has been recently developed (Galli et al., 2022).

TODO objective

After that, discuss your approach, and motivate why you follow that approach. If you are drawing inspiration from an existing model, study, paper, textbook example, challenge, . . . , be sure to add all the necessary references (Chowdhery et al., 2022; Lorenzo et al., 2022; Antici et al., 2021; Nakov et al., 2021; Röttger et al., 2022; Lippi and Torroni, 2016).[1]

TODO approach

Class imbalance (Henning et al., 2023)

GE3 (Wei, 2021)

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[1]Add only what is relevant.

Focal loss (Lin et al., 2018)

(Licari and Comandè, 2024)

Next, give a brief summary of your experimental setup: how many experiments did you run on which dataset. Last, make a list of the main results or take-home lessons from your work.

TODO experimental setup

> HERE AND EVERYWHERE ELSE: ALWAYS KEEP IN MIND THAT, CRUCIALLY, WHATEVER TEXT/CODE/-FIGURES/IDEAS/... YOU TAKE FROM ELSEWHERE MUST BE CLEARLY IDENTIFIED AND PROPERLY REFERENCED IN THE REPORT.

2 Background

> MAX 2 COLUMNS (3 FOR COMBINED REPORTS). DO NOT INCLUDE SECTION IF NO BACKGROUND NEC-ESSARY. OMIT SECTION IN ASSIGNMENT REPORTS.

The Background section is where you briefly provide whatever background information on the domain or challenge you're addressing and/or on the techniques/approaches you're using, that (1) you think is necessary for the reader to understand your work and design choices, and (2) is not something that has been explained to you during the NLP course (to be clear: do NOT repeat explanations of things seen in class, we already know that stuff). If you adapt paragraphs from articles, books, online resources, etc: be sure to clarify which parts are yours and which ones aren't.

TODO background

3 System description

> MAX 1 COLUMN FOR ASSIGNMENT REPORTS / 4 COLUMNS FOR PROJECT OR PW / 6 FOR COMBINED REPORTS.

Describe the system or systems you have implemented (architectures, pipelines, etc), and used to run your experiments. If you reuse parts of code written by others, be sure to make very clear your original contribution in terms of

- architecture: is the architecture your design or did you take it from somewhere else

- coding: which parts of code are original or heavily adapted? adapted from existing sources? taken from external sources with minimal adaptations?

It is a good idea to add figures to illustrate your pipeline and/or architecture(s) (see Figure 1)

4 Data

> MAX 2 COLUMNS / 3 FOR COMBINED REPORTS. OMIT SECTION IN ASSIGNMENT REPORTS.

Provide a brief description of your data including some statistics and pointers (references to articles/URLs) to be used to obtain the data. Describe any pre-processing work you did. Links to datasets must be placed later in Section 8.

TODO Data

(Galli et al., 2022)

5 Experimental setup and results

> MAX 1 COLUMN FOR ASSIGNMENT REPORTS / 3 COLUMNS FOR PROJECT OR PW / 5 FOR COMBINED REPORTS.

Describe how you set up your experiments: which architectures/configurations you used, which hyper-parameters and what methods used to set them, which optimizers, metrics, etc.

Then, **use tables** to summarize your your findings (numerical results) in validation and test. If you don't have experience with tables in LaTeX, you might want to use LaTeXtable generator to quickly create a table template.

6 Discussion

> MAX 1.5 COLUMNS FOR ASSIGNMENT REPORTS / 3 COLUMNS FOR PROJECT / 4 FOR COMBINED REPORTS. ADDITIONAL EXAMPLES COULD BE PLACED IN AN APPENDIX AFTER THE REFERENCES IF THEY DO NOT FIT HERE.

Here you should make your analysis of the results you obtained in your experiments. Your discussion should be structured in two parts:

- discussion of quantitative results (based on the metrics you have identified earlier; compare with baselines);

- error analysis: show some examples of odd-/wrong/unwanted outputs; reason about why you are getting those results, elaborate on what could/should be changed in future developments of this work.

7 Conclusion

> MAX 1 COLUMN.

In one or two paragraphs, recap your work and main results. What did you observe? Did all go
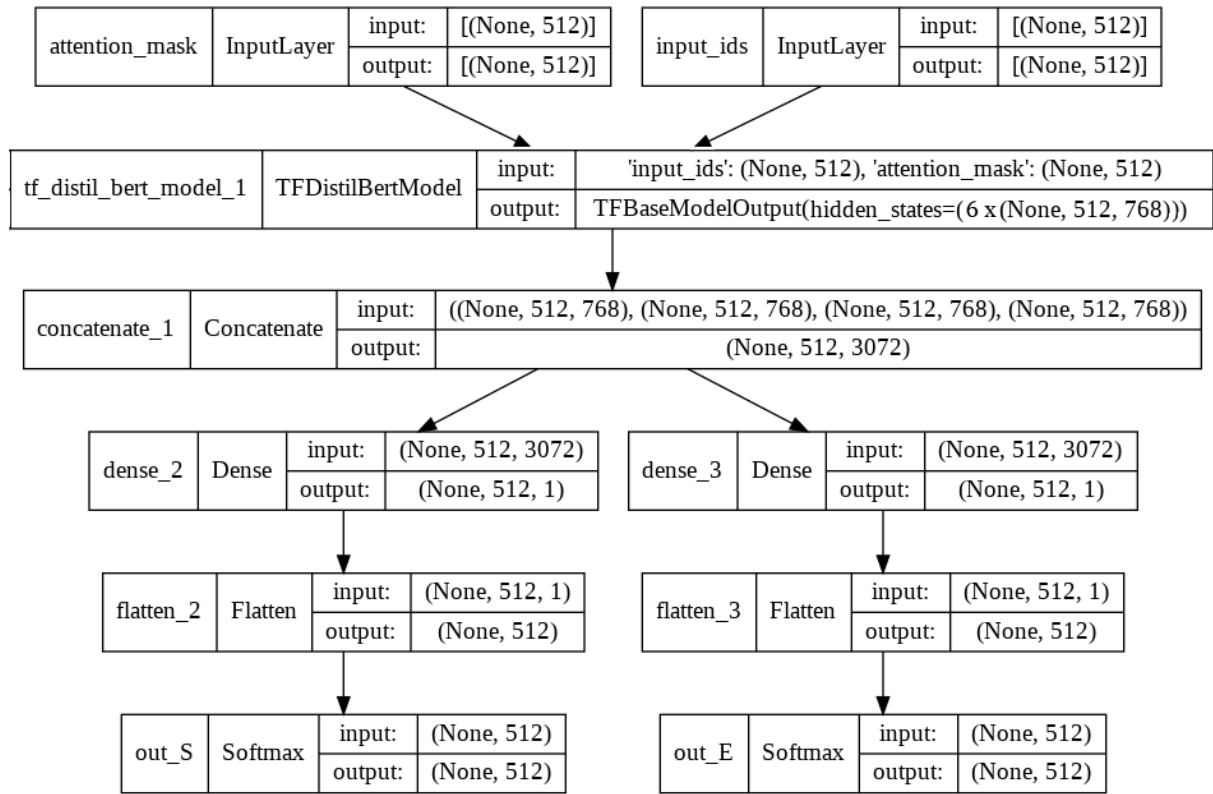
Figure 1: Model architecture

according to expectations? Was there anything surprising or worthwhile mentioning? After that, discuss the main limitations of the solution you have implemented, and indicate promising directions for future improvement.

8 Links to external resources

THIS SECTION IS OPTIONAL
Insert here:

- a link to your GitHub or any other public repo where one can find your code (only if you did not submit your code on Virtuale);

- a link to your dataset (only for non-standard projects or project works).

DO NOT INSERT CODE IN THIS REPORT

References

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