



TECHNICAL REPORT

No. CCLS-13-02

Title: LDC Arabic Treebanks and Associated Corpora:
Data Divisions Manual

Authors: Mona Diab, Nizar Habash, Owen Rambow and
Ryan Roth

Copyright Center for Computational Learning Systems - CCLS
Columbia University
<http://www.ccls.columbia.edu>

LDC Arabic Treebanks and Associated Corpora: Data Divisions Manual

Mona Diab and Nizar Habash and Owen Rambow and Ryan Roth
Center for Computational Learning Systems

Columbia University

{diab, habash, rambow, ryanr}@cccls.columbia.edu

Version: 1.0

1 Introduction

The Linguistic Data Consortium (LDC) has developed hundreds of data corpora for natural language processing (NLP) research. Among these are a number of annotated treebank corpora for Arabic. Typically, these corpora consist of a single collection of annotated documents. NLP research, however, usually requires multiple data sets for the purposes of training models, developing techniques, and final evaluation. Therefore it becomes necessary to divide the corpora used into the required data sets (divisions).

Unfortunately, there is no universally accepted convention or standard for dividing bulk corpora. This caused different research groups to either define their own divisions (which makes comparison to similar research results difficult) or adopt existing published divisions (which do not adapt as new corpora versions are released). When a new treebank is released, a new division needs to be developed, which may or may not be consistent with the other treebank divisions.

This document details a set of rules that have been defined to enable consistent divisions for old and new Arabic treebanks (ATB) and related corpora. These rules have been applied to the currently available LDC Modern Standard Arabic Treebanks (ATB1 - ATB12) [7, 8], the Egyptian Arabic Treebanks (ARZ1 - ARZ8) [9] and the spoken Levantine ATB [6], and the exact divisions are listed in tables.

2 Arabic Treebanks and Related Corpora

The LDC has released a number of annotated treebanks for Modern Standard Arabic; this paper only examines the first 12; note that, historically, ATB1, ATB2 and ATB3 have been the most frequently utilized and updated. In addition to the MSA ATBs, this paper examines the first 8 Egyptian Treebanks (ARZ1 - ARZ8), and an older spoken Levantine treebank.

Each treebank has gone through one or more versions; new versions typically only alter the annotations in the treebank, and do not usually alter the raw text or documents used. This means that a division defined for a treebank can usually be safely applied to future versions of the same treebank. However, if a new version adds or removes documents then the data division needs to be redefined.

The treebanks examined, their versions and their LDC catalog numbers are listed in Table 1.

3 Division Rules

In defining a set of data division rules, there are several goals. First, at a minimum there needs to be a defined training set (TRAIN), a defined development set (DEV) and a defined testing set (TEST).

Second, the DEV and TEST sections should be taken from well-separated regions of the corpora, in order to ensure that similar results derived from each are not due to mere proximity of subject matter.

Third, divisions should be applied across document boundaries, not sentence or word boundaries, to prevent the need to break apart documents.

Fourth, the divisions should not utilize any random processes in selection; randomly selecting documents for each division may or may not improve model performance, but will make describing the data divisions in publications more difficult.

Fifth, the defined TEST divisions should be at least as large as the largest (commonly-used) TEST divisions previously defined for that treebank, and include the same files. By requiring this, comparisons to previous results using those previous TEST divisions are still possible, simply by excluding any extra documents in the current TEST division.

Finally, each TRAIN division should hold roughly 80% of the corpora by word volume, with the remainder split across the other divisions.

These goals are accomplished by the following procedure:

Treebank Label	Version	LDC Catalog Number
MSA Treebanks		
ATB1	4.1	LDC2010T13
ATB2	3.1	LDC2011T09
ATB3	3.2	LDC2010T08
ATB4	1.0	LDC2005T30
ATB5	1.0	LDC2009E72
ATB6	1.0	LDC2009E108
ATB7	1.0	LDC2009E114
ATB8	1.0	LDC2010E11
ATB9	1.0	LDC2010E19
ATB10	1.0	LDC2010E22
ATB11	1.0	LDC2011E16
ATB12	1.0	LDC2011E17
Egyptian Treebanks		
ARZ1	2.0	LDC2012E93
ARZ2	2.0	LDC2012E98
ARZ3	2.0	LDC2012E89
ARZ4	2.0	LDC2012E99
ARZ5	2.0	LDC2012E107
ARZ6	2.0	LDC2012E125
ARZ7	2.0	LDC2013E12
ARZ8	2.0	LDC2013E21
Levantine Treebanks		
Spoken Levantine	2.0	LDC2005E78

Table 1: Considered LDC Arabic Treebanks and Associated Corpora

1. The documents in the treebank are sorted by document name
2. Documents from start of the document list (that is, those alphabetically first) are set into the DEV division until the total word count in DEV exceeds 10% of the total corpora word count
3. Documents from the end of the document list are set into the TEST division until the total word count in TEST exceeds 10% of the total corpora word count
4. The remaining documents (roughly 80% of the total word count) are set into the TRAIN division

If a particular project requires additional divisions beyond TRAIN, DEV and TEST, the project should take the needed documents from the TRAIN division, to ensure that the DEV and TEST divisions remain constant and stable.

4 Arabic Treebank Divisions

Tables 2 - 8 list the exact document divisions produced for each treebank when the above division rules are applied. The Document Range column lists the beginning and ending document for that data subset. The number of documents and number of raw words contained in each data subset are also listed.

Note that ATB6 is a special case; this MSA treebank contains text taken from newswire, newsgroup and weblog genre sources, which often need to be isolated from each other. Therefore each of these genres is treated as an independent sub-treebank, with its own DEV, TRAIN, and TEST divisions.

Division	# Docs	# Words	Document Range
ATB1 DEV	71	14635	20000715_AFP_ARB.0001 - 20000715_AFP_ARB.0073
ATB1 TRAIN	568	116198	20000715_AFP_ARB.0074 - 20001115_AFP_ARB.0128
ATB1 TEST	95	14553	20001115_AFP_ARB.0129 - 20001115_AFP_ARB.0236
ATB2 DEV	50	14468	UMAAH_UM.ARB_20010721-e.0018 - UMAAH_UM.ARB_20020217-a.0019
ATB2 TRAIN	400	115147	UMAAH_UM.ARB_20020224-a.0005 - UMAAH_UM.ARB_backissue_34-a.0013
ATB2 TEST	51	14584	UMAAH_UM.ARB_backissue_34-a.0014 - UMAAH_UM.ARB_backissue_40-e.0025
ATB3 DEV	58	34033	ANN20020115.0001 - ANN20020115.0110
ATB3 TRAIN	480	271646	ANN20020215.0001- ANN20021115.0033
ATB3 TEST	61	34031	ANN20021115.0034 - ANN20021215.0045

Table 2: ATB 1,2,3 Data Divisions. These are the most commonly used ATBs, and are often combined. The current versions are ATB1 V4.1, ATB2 V3.1, and ATB3 V3.2.

Division	# Docs	# Words	Document Range
ATB4 DEV	41	16344	ASB20040928.0001 - ASB20041003.0004
ATB4 TRAIN	315	129310	ASB20041003.0005 - ASB20041101.0001
ATB4 TEST	41	16261	ASB20041101.0002 - ASB20041104.0019
ATB5 DEV	3	12442	ALHURRA_NEWS10_ARB_20051127_100101 - ALHURRA_NEWS13_ARB_20051121_130100
ATB5 TRAIN	24	77257	ALHURRA_NEWS13_ARB_20051123_130100.qtr - DUBAI_DUBAINews_ARB_20050223_113000
ATB5 TEST	4	10927	DUBAI_DUBAINews_ARB_20050228_113000 - DUBAI_DUBAINews_ARB_20051219_112801

Table 3: ATB4 and ATB5 Data Divisions. Both of these treebanks are currently version 1.0.

Division	# Docs	# Words	Document Range
NEWSWIRE			
ATB6 NW DEV	13	2910	AAW_ARB_20080502.0027-S1 - AFP_ARB_20080510.0077-S1
ATB6 NW TRAIN	96	21738	AFP_ARB_20080512.0051-S1 - QDS_ARB_20080517.0021-S1
ATB6 NW TEST	13	2836	QDS_ARB_20080517.0046-S1 - XIN_ARB_20080522.0166-S1
NEWSGROUP			
ATB6 NG DEV	4	873	arb-NG-2-76511-10666609-S1 - arb-NG-2-76513-10114621-S1
ATB6 NG TRAIN	27	6124	arb-NG-2-76513-10667328-S1 - arb-NG-31-114370-10352403-S2
ATB6 NG TEST	4	1018	arb-NG-95-174352-11045427-S1 - arb-NG-95-174357-11048231-S2
WEBLOG			
ATB6 WL DEV	9	1948	arb-WL-1-152170-10153737-S2 - arb-WL-1-152350-10158443-S1
ATB6 WL TRAIN	68	15430	arb-WL-1-152375-10682332-S1 - arb-WL-7-88414-10669660-S2
ATB6 WL TEST	9	2064	arb-WL-7-88466-10669891-S1 - arb-WL-7-89199-10673129-S1

Table 4: ATB6 V1.0 Data Divisions. This treebank has multiple genres, which typically need to be isolated from each other. Therefore, each genre (newswire, newsgroup, weblog) is treated as a separate sub-treebank here.

Division	# Docs	# Words	Document Range
ATB7 DEV	1	4052	ALFAYHA_NEWS_ARB_20080401_210000
ATB7 TRAIN	10	25723	ALHURRA_THEGLOBAL_ARB_20080118_210000 - SAWA_SAWANEWS_ARB_20080208_181500
ATB7 TEST	4	4589	SAWA_SAWANEWS_ARB_20080304_221500 - SAWA_SAWANEWS_ARB_20080307_221500
ATB8 DEV	2	8109	ABUDHABI_ABUDHNEWS2_ARB_20070228_000000.qrtr - ABUDHABI_ABUDHNEWS_ARB_20070110_115800.qrtr
ATB8 TRAIN	12	57750	ABUDHABI_ABUDHNEWS_ARB_20070117_115800.qrtr - ALHURRA_THEWORLD TODAY_ARB_20080208_170000
ATB8 TEST	4	9275	ALURDUNYA_URDUNYANEWS_ARB_20070312_000000.qrtr - ARABIYA_ALARABIYANEWS2_ARB_20070312_000000.qrtr
ATB9 DEV	3	10966	ARABIYA_ALARABIYANEWS2_ARB_20070316_000000.qrtr - ARABIYA_ALARABIYANEWS2_ARB_20080409_200000
ATB9 TRAIN	13	53955	ARABIYA_LATEHRNEWS_ARB_20070222_000000.qrtr - SYRIANTV_NEWS25_ARB_20070122_162800.qrtr
ATB9 TEST	2	12593	SYRIANTV_NEWS25_ARB_20070129_162800.qrtr - SYRIANTV_NEWS25_ARB_20070201_162801.qrtr
ATB10 DEV	1	5972	ALHURRA_THEGLOBAL_ARB_20080205_210000
ATB10 TRAIN	7	30961	ALJZ_TODHARV_ARB_20070107_145800.qrtr - SAUDITV_SAUDINEWS2_ARB_20080326_190000
ATB10 TEST	1	4462	SAUDITV_SAUDINEWS2_ARB_20080402_200000
ATB11 DEV	11	4412	ABDULEMAM_20041226.1648 - DIGRESSING_20041107.0106
ATB11 TRAIN	83	30195	DIGRESSING_20041109.0437 - TAREEKALSHAAB_20041114.1958
ATB11 TEST	11	4080	TAREEKALSHAAB_20041114.1959 - ZAYEDALSAIDI_20050221.1414
ATB12 DEV	3	15470	ABUDHABI_ABUDHNEWS_ARB_20070111_115801.qrtr - ALAM_NEWSRPT_ARB_20070102_015800.qrtr
ATB12 TRAIN	25	88367	ALAM_NEWSRPT_ARB_20070111_015800.qrtr - SCOLA_JORDNNSCO_ARB_20070308_095800.qrtr
ATB12 TEST	3	12565	SCOLA_SAUDNNSCO_ARB_20070222_215800.qrtr - SYRIANTV_NEWS25_ARB_20070208_162800.qrtr

Table 5: ATB7 - ATB12 Data Divisions. All of these treebanks are currently version 1.0.

Division	# Docs	# Words	Document Range
ARZ1 DEV	4	3842	bolt-arz-NG-169-181081-14577.arz.su - bolt-arz-NG-169-181081-19026.arz.su
ARZ1 TRAIN	46	28837	bolt-arz-NG-169-181081-21390.arz.su - bolt-arz-NG-169-181090-38942.arz.su
ARZ1 TEST	8	4078	bolt-arz-NG-169-181090-38993.arz.su - bolt-arz-NG-169-181090-40037.arz.su
ARZ2 DEV	4	3280	bolt-arz-NG-169-181081-16222.arz.su - bolt-arz-NG-169-181081-68225.arz.su
ARZ2 TRAIN	31	22201	bolt-arz-NG-169-181081-68287.arz.su - bolt-arz-NG-169-181090-39607.arz.su
ARZ2 TEST	3	3732	bolt-arz-NG-169-181090-39695.arz.su - bolt-arz-NG-169-181090-40322.arz.su
ARZ3 DEV	8	3682	bolt-arz-DF-175-182187-572764.arz.su - bolt-arz-DF-175-182187-577973.arz.su
ARZ3 TRAIN	43	24067	bolt-arz-DF-175-182187-578399.arz.su - bolt-arz-NG-169-181090-40341.arz.su
ARZ3 TEST	5	3762	bolt-arz-NG-169-181090-40504.arz.su - bolt-arz-NG-169-181092-26920.arz.su
ARZ4 DEV	5	6321	bolt-arz-DF-175-182187-575959.arz.su - bolt-arz-DF-175-182187-581488.arz.su
ARZ4 TRAIN	64	30285	bolt-arz-DF-175-182187-581658.arz.su - bolt-arz-DF-175-182192-10963633.arz.su
ARZ4 TEST	7	4855	bolt-arz-DF-175-182258-1245345.arz.su - bolt-arz-NG-169-181090-40249.arz.su
ARZ5 DEV	9	4021	bolt-arz-DF-169-181089-15751715.arz.su - bolt-arz-DF-169-181091-8751442.arz.su
ARZ5 TRAIN	73	28361	bolt-arz-DF-175-182185-10963619.arz.su - bolt-arz-DF-204-185979-1392879.arz.su
ARZ5 TEST	13	4037	bolt-arz-DF-204-185979-1393182.arz.su - bolt-arz-NG-169-181081-72955.arz.su
ARZ6 DEV	19	10542	bolt-arz-DF-169-181090-8816189.arz.su - bolt-arz-DF-175-182187-572570.arz.su
ARZ6 TRAIN	164	77382	bolt-arz-DF-175-182187-572693.arz.su - bolt-arz-DF-207-186125-504972.arz.su
ARZ6 TEST	16	10997	bolt-arz-DF-207-186125-506363.arz.su - bolt-arz-NG-169-181090-40862.arz.su

Table 6: Egyptian Arabic Treebank Data Divisions (ARZ 1-6). All above treebanks are currently version 2.0.

Division	# Docs	# Words	Document Range
ARZ7 DEV	4	6462	bolt-arz-DF-175-182187-572367.arz.su - bolt-arz-DF-175-182187-573032.arz.su
ARZ7 TRAIN	76	47175	bolt-arz-DF-175-182187-575718.arz.su - bolt-arz-DF-210-186177-3027514.arz.su
ARZ7 TEST	13	7475	bolt-arz-DF-210-186206-3701939.arz.su - bolt-arz-DF-217-194296-6676523.arz.su
ARZ8 DEV	15	6895	bolt-arz-DF-175-182187-572370.arz.su - bolt-arz-DF-175-182188-1048352.arz.su
ARZ8 TRAIN	91	51085	bolt-arz-DF-175-182188-1048449.arz.su - bolt-arz-DF-221-194675-6456787.arz.su
ARZ8 TEST	9	7074	bolt-arz-DF-221-194675-6456952.arz.su - bolt-arz-DF-222-194704-7228783.arz.su

Table 7: Egyptian Arabic Treebank Data Divisions (ARZ 7-8). All above treebanks are currently version 2.0.

Division	# Docs	# Words	Document Range
LEV DEV	3	3535	fsa_16902 - fsa_16920
LEV TRAIN	18	20871	fsa_16921 - fsa_17781
LEV TEST	3	3030	fsa_17920 - fsa_18520

Table 8: Spoken Levantine ATB Version 2.0 Data Divisions

Division	# Docs	# Words	Document Range
ATB 3 TRAIN	509	288046	ANN20020115.0001 - ANN20021015.0100
ATB 3 DEVTEST	90	51664	ANN20021015.0101 - ANN20021215.0045

Table 9: ATB3 Zitouni Data Division

5 Previous Data Divisions

This section lists some of the more commonly used, previously defined data divisions used for the MSA Treebanks ATB1, ATB2 and/or ATB3. They are described here for reference.

5.1 Zitouni

This data division was defined for ATB3 by Zitouni et al. [10]. This division divides the ATB3 corpora on the document level. The documents are sorted by file name alphabetically; the first 509 documents (about 85% of the words) are set as the TRAIN set, and the remainder is used as a single development-test set (DEVTEST). The Zitouni division is shown in Table 5.1.

It should be noted that the Zitouni TRAIN section starts at the beginning of the sorted document list and is followed by its DEVTEST section. This means that Zitouni TRAIN only has partial overlap with the ATB3 TRAIN division defined in this paper (hereafter referred to as 10-80-10 ATB3). The Zitouni DEVTEST division, while largely overlapping with the 10-80-10 ATB3 TEST defined here, contains 29 files assigned to 10-80-10 ATB3 TRAIN (documents ANN20021015.0101 - ANN20021115.0033).

5.2 MADA

This data division was defined for use in training and testing the models used within the MADA (Morphological Arabic Disambiguation and Analysis) tool developed by Habash and Rambow [5]. The splits used in the first MADA paper [4] were different. Initially the MADA division used only a copy of the Zitouni division of ATB3 that had its DEVTEST division divided evenly into DEV and TEST subsets. However, later versions of MADA included the entirety of ATB1

Division	# Docs	# Words	Document Range
ATB1 TRAIN	734	145386	20000715_AFP_ARB.0001 - 20001115_AFP_ARB.0236
ATB2 TRAIN	501	144199	UMAAH_UM.ARB_20010721-e.0018 - UMAAH_UM.ARB_backissue_40-e.0025
ATB3 TRAIN	509	288046	ANN20020115.0001 - ANN20021015.0100
ATB3 DEV	45	26359	ANN20021015.0101 - ANN20021115.0066
ATB3 TEST	45	25305	ANN20021115.0068 - ANN20021215.0045

Table 10: ATB1, ATB2, ATB3 MADA Data Division

and ATB2 as additional training data (that is, the ATB1 and ATB2 treebanks were not divided). The individual ATB MADA divisions are shown in Table 10.

The MADA ATB3 TRAIN division has the same issue as the Zitouni TRAIN division for 10-80-10 ATB3, in that it starts including documents from the top of the sorted document list, leading to partial TRAIN overlap. However, the MADA ATB3 TEST portion is smaller (by 16 documents) than the 10-80-10 ATB3 TEST portion defined here. This means any system trained on 10-80-10 ATB3 TRAIN can evaluate on MADA ATB3 TEST without concern for evaluating on data seen in training. This allows for meaningful comparisons to previous work that used MADA ATB3 TEST.

5.3 JHU - Stanford

This division was defined in the John Hopkins 2005 Workshop [1] and was subsequently picked up by the Stanford Natural Language Processing Group [3]. This split was based on an earlier version from Diab et al. [2]. This division was applied to the MSA ATB1, ATB2, and ATB3 treebanks as a whole. The division sorted the documents in each ATB by document name before combining the treebanks. Then a set of documents from the end of each list was set aside and combined into a single TEST set. Then several documents were selected from the remainder (randomly), and combined into a DEVTEST set. The remaining documents were combined into a single TRAIN set.

Since the documents in the DEVTEST set were selected with a random process, the division cannot be represented as a range in a sorted list of documents.

However, the full document listing (too long to reproduce here) can be found on the Stanford NLP group website.¹

Because of the way in which the JHU DEVTEST divisions were defined randomly, there is only partial overlap between the corresponding 10-80-10 TRAN and DEV divisions. However, the JHU TEST division is a subset of the combined 10-80-10 ATB1, ATB2 and ATB3 TEST divisions. Like with the MADA case, this means that any system trained on 10-80-10 ATB1, ATB2, and/or ATB3 can be evaluated on JHU TEST without a data sharing issue.

References

- [1] David Chiang, Mona Diab, Nizar Habash, Owen Rambow, and Safiullah Shareef. Parsing Arabic Dialects. In *Proceedings of the European Chapter of ACL (EACL)*, 2006.
- [2] Mona Diab, Kadri Hacioglu, and Daniel Jurafsky. Automatic Tagging of Arabic Text: From Raw Text to Base Phrase Chunks. In *Proceedings of the 5th Meeting of the North American Chapter of the Association for Computational Linguistics/Human Language Technologies Conference (HLT-NAACL04)*, pages 149–152, Boston, MA, 2004.
- [3] Spence Green and Christopher D. Manning. Better Arabic Parsing: Baselines, Evaluations, and Analysis. In *Proceedings of the 23rd International Conference on Computational Linguistics (Coling 2010)*, pages 394–402, Beijing, China, 2010.
- [4] Nizar Habash and Owen Rambow. Arabic Tokenization, Part-of-Speech Tagging and Morphological Disambiguation in One Fell Swoop. In *Proceedings of the 43rd Annual Meeting of the ACL*, pages 573–580, Ann Arbor, Michigan, 2005.
- [5] Nizar Habash and Owen Rambow. Arabic Diacritization through Full Morphological Tagging. In *Proceedings of the 8th Meeting of the North American Chapter of the Association for Computational Linguistics/Human Language Technologies Conference (HLT-NAACL07)*, 2007.

¹<http://nlp.stanford.edu/software/parser-arabic-data-splits.shtml>

- [6] Mohamed Maamouri, Ann Bies, Tim Buckwalter, Mona Diab, Nizar Habash, Owen Rambow, and Dalila Tabessi. Developing and Using a Pilot Dialectal Arabic Treebank, 2006.
- [7] Mohamed Maamouri, Ann Bies, Tim Buckwalter, and Wigdan Mekki. The Penn Arabic Treebank : Building a Large-Scale Annotated Arabic Corpus, 2004.
- [8] Mohamed Maamouri, Ann Bies, Sondos Krouna, Fatma Gaddeche, and Basma Bouziri. *Penn Arabic Treebank Guidelines*. Linguistic Data Consortium, 2009.
- [9] Mohamed Maamouri, Ann Bies, Seth Kulick, Dalila Tabessi, and Sondos Krouna. Egyptian Arabic Treebank Pilot, 2012.
- [10] Imed Zitouni, Jeffrey S. Sorensen, and Ruhi Sarikaya. Maximum Entropy Based Restoration of Arabic Diacritics. In *Proceedings of the 21st International Conference on Computational Linguistics and 44th Annual Meeting of the Association for Computational Linguistics*, pages 577–584, Sydney, Australia, 2006.