from relation detection and 27% (237/864) of errors results from relation characterization, among which 17.8% (154/864) of errors are from misclassification across relation types and 9.6% (83/864) of errors are from misclassification of relation subtypes inside the same relation types. This suggests that relation detection is critical for relation extraction.

# of relations		# of other mentions in between					
		0	1	2	3	>=4	Overall
#	0	3991	161	11	0	0	4163
of	1	2350	315	26	2	0	2693
the words	2	465	95	7	2	0	569
in	3	311	234	14	0	0	559
between	4	204	225	29	2	3	463
	5	111	113	38	2	1	265
	>=6	262	297	277	148	134	1118
	Overall	7694	1440	402	156	138	**9830**

Table 3: Distribution of relations over #words and #other mentions in between in the training data

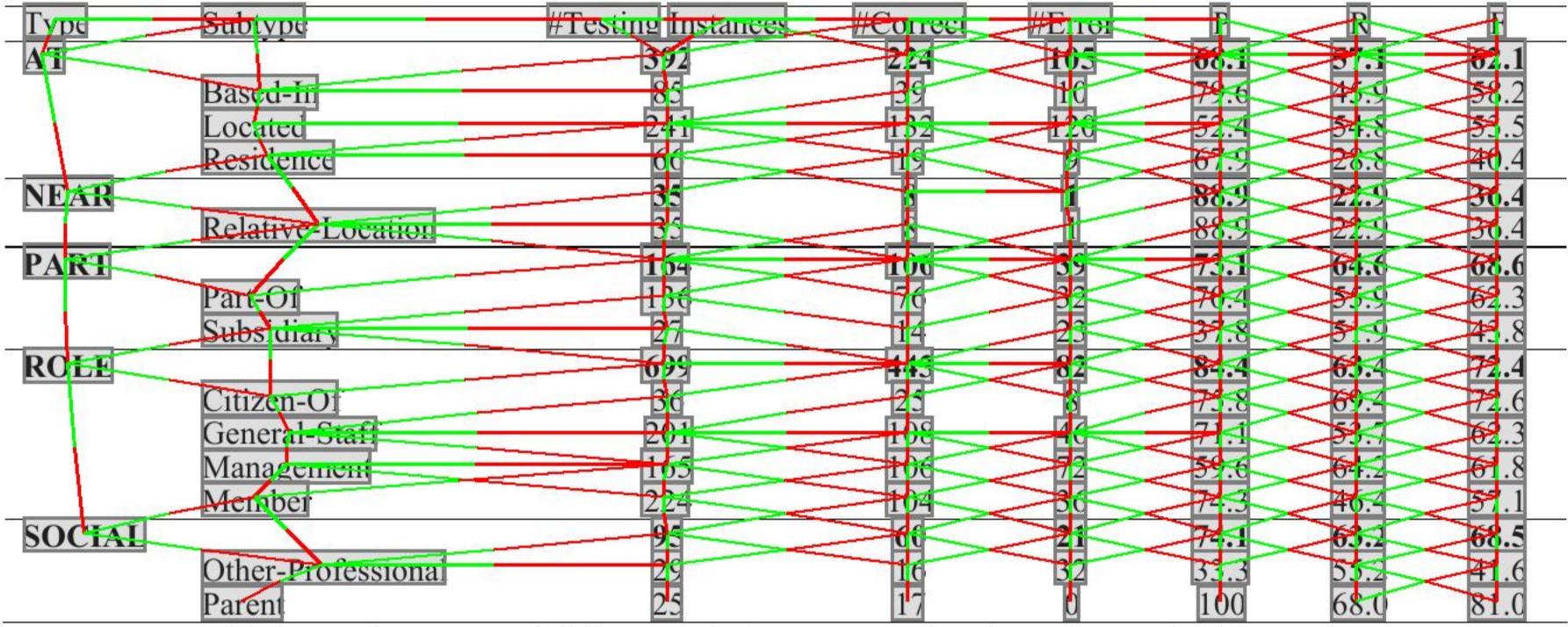| Type	Subtype	#Testing Instances	#Correct	#Error	P	R	F
AT		392	224	105	68.1	57.1	62.1
	Based-in	89	59	10	79.6	4?.9	56.2
	Located	241	152	126	5?.?	54.?	53.5
	Residence	60	1?	7	67.?	26.?	40.4
NEAR		35	8	1	88.9	22.9	36.4
	Relative-Location	35	8	1	88.9	22.9	36.4
PART		1?4	100	39	7?.1	64.6	68.6
	Part-Of	156	76	32	7?.4	5?.9	62.3
	Subsidiary	27	14	23	3?.8	5?.?	4?.8
ROLE		699	443	82	8?.4	63.?	72.4
	Citizen-Of	36	23	9	7?.?	6?.?	72.6
	General-Staff	201	108	?	71.1	5?.7	62.3
	Management	165	106	52	5?.6	6?.2	61.8
	Member	224	104	36	7?.3	46.?	5?.1
SOCIAL		9?	66	21	7?.1	63.2	68.5
	Other-Professional	29	16	32	3?.3	5?.2	4?.6
	Parent	25	17	0	100	68.0	81.0

Table 4: Performance of different relation types and major subtypes in the test data

System	Relation Detection			RDC on Types			RDC on Subtypes		
	P	R	F	P	R	F	P	R	F
Ours: feature-based	**84.8**	**66.7**	**74.7**	**77.2**	**60.7**	**68.0**	63.1	**49.5**	**55.5**
Kambhatla (2004):feature-based	-	-	-	-	-	-	**63.5**	45.2	52.8
Culotta et al (2004):tree kernel	81.2	51.8	63.2	67.1	35.0	45.8	-	-	-

Table 5: Comparison of our system with other best-reported systems on the ACE corpus

Error Type		#Errors
Detection Error	False Negative	462
	False Positive	165
Characterization Error	Cross Type Error	154
	Inside Type Error	83

Table 6: Distribution of errors

6 Discussion and Conclusion

In this paper, we have presented a feature-based approach for relation extraction where diverse lexical, syntactic and semantic knowledge are employed. Instead of exploring the full parse tree information directly as previous related work, we incorporate the base phrase chunking information first. Evaluation on the ACE corpus shows that base phrase chunking contributes to most of the performance improvement from syntactic aspect while further incorporation of the parse tree and dependence tree information only slightly improves the performance. This may be due to three reasons: First, most of relations defined in ACE have two mentions being close to each other. While short-distance relations dominate and can be resolved by simple features such as word and chunking features, the further dependency tree and parse tree features can only take effect in the remaining much less and more difficult long-distance relations. Second, it is well known that full parsing