tag	accuracy	f1 score	accuracy for unknown words	accuracy for known words	number of unknown words	number of known words
A (إسم)	83.33 %	12.99 %	63.64 %	84.36 %	11	211
B (رقم)	97.63 %	19.76 %	83.33 %	98.05 %	6	205
C (إسم معرف)	82.17 %	11.28 %	73.33 %	83.1 %	15	142
D (إضافة)	82.8 %	12.94 %	64.29 %	84.62 %	14	143
E (منعوت)	90.41 %	13.57 %	80.0 %	90.78 %	5	141
F (نعت)	85.63 %	11.53 %	72.22 %	87.25 %	18	149
G (حرف جر)	78.72 %	17.62 %	NULL	78.72 %	0	47
H (إسم مجرور)	72.22 %	16.77 %	42.86 %	90.91 %	14	22
I (وحدة قيس)	93.16 %	24.12 %	33.33 %	94.74 %	3	114
J (واو العطف)	90.7 %	19.02 %	NULL	90.7 %	0	43
K (فعل مبني للمجهول)	54.17 %	14.05 %	0.0 %	61.9 %	3	21
L (المفعول المطلق)	0.0 %	0.0 %	NULL	0.0 %	0	1
M (أداةُ عَطْفٌ غير واو العطف)	30.0 %	9.23 %	NULL	30.0 %	0	10
.	100.0 %	100.0 %	NULL	100.0 %	0	784

Table 1: Performances for each tag of our ingredient extractor for fold 5 and for the first layer with $\lambda = 4$ using a first order HMM

tag	accuracy	f1 score	accuracy for unknown words	accuracy for known words	number of unknown words	number of known words
A (إسم)	94.59 %	62.35 %	81.82 %	95.26 %	11	211
B (رقم)	98.58 %	49.64 %	100.0 %	98.54 %	6	205
C (إسم معرف)	93.63 %	47.12 %	93.33 %	93.66 %	15	142
D (إضافة)	84.71 %	59.96 %	42.86 %	88.81 %	14	143
E (منعوت)	95.89 %	63.66 %	40.0 %	97.87 %	5	141
F (نعت)	83.83 %	57.08 %	72.22 %	85.23 %	18	149
G (حرف جر)	93.62 %	32.23 %	NULL	93.62 %	0	47
H (إسم مجرور)	66.67 %	44.99 %	50.0 %	77.27 %	14	22
I (وحدة قيس)	100.0 %	100.0 %	100.0 %	100.0 %	3	114
J (واو العطف)	95.35 %	48.81 %	NULL	95.35 %	0	43
K (فعل مبني للمجهول)	79.17 %	22.09 %	66.67 %	80.95 %	3	21
L (المفعول المطلق)	100.0 %	100.0 %	NULL	100.0 %	0	1
M (أداةُ عَطْفٌ غير واو العطف)	80.0 %	29.63 %	NULL	80.0 %	0	10
.	99.49 %	33.25 %	NULL	99.49 %	0	784

Table 2: Performances for each tag of our ingredient extractor for fold 5 and for the second layer with $\lambda = 4$

Tag	First Layer first order HMM				Second Layer second order HMM			
	accuracy	f1 score	accuracy unknown words	accuracy known words	accuracy	f1 score	accuracy unknown words	accuracy known words
A (إسم)	83.33 %	12.99 %	63.64 %	84.36 %	94.59 %	62.35 %	81.82 %	95.26 %
B (رقم)	97.63 %	19.76 %	83.33 %	98.05 %	98.58 %	49.64 %	100.0 %	98.54 %
C (إسم معرف)	82.17 %	11.28 %	73.33 %	83.1 %	93.63 %	47.12 %	93.33 %	93.66 %
D (إضافة)	82.8 %	12.94 %	64.29 %	84.62 %	84.71 %	59.96 %	42.86 %	88.81 %
E (منعوت)	90.41 %	13.57 %	80.0 %	90.78 %	95.89 %	63.66 %	40.0 %	97.87 %
F (نعت)	85.63 %	11.53 %	72.22 %	87.25 %	83.83 %	57.08 %	72.22 %	85.23 %
G (حرف جر)	78.72 %	17.62 %	NULL	78.72 %	93.62 %	32.23 %	NULL	93.62 %
H (إسم مجرور)	72.22 %	16.77 %	42.86 %	90.91 %	66.67 %	44.99 %	50.0 %	77.27 %
I (وحدة قيس)	93.16 %	24.12 %	33.33 %	94.74 %	100.0 %	100.0 %	100.0 %	100.0 %
J (واو العطف)	90.7 %	19.02 %	NULL	90.7 %	95.35 %	48.81 %	NULL	95.35 %
K (فعل مبني للمجهول)	54.17 %	14.05 %	0.0 %	61.9 %	79.17 %	22.09 %	66.67 %	80.95 %
L (المفعول المطلق)	0.0 %	0.0 %	NULL	0.0 %	100.0 %	100.0 %	NULL	100.0 %
M (أداةُ عَطْفٌ غير واو العطف)	30.0 %	9.23 %	NULL	30.0 %	80.0 %	29.63 %	NULL	80.0 %
.	100.0 %	100.0 %	NULL	100.0 %	99.49 %	33.25 %	NULL	99.49 %

Table 3: Performances for each tag of our ingredient extractor for fold 5 and for the first and second layer with $\lambda = 4$

	First Layer first order HMM				Second Layer second order HMM			
Fold	accuracy	f1 score	accuracy unknown words	accuracy known words	accuracy	f1 score	accuracy unknown words	accuracy known words
0	90.33 %	70.61 %	50.55 %	92.14 %	95.43 %	66.98 %	61.54 %	96.97 %
1	87.65 %	73.73 %	52.03 %	89.76 %	93.92 %	65.93 %	70.73 %	95.28 %
2	88.97 %	75.28 %	66.99 %	90.16 %	94.44 %	66.9 %	66.02 %	95.97 %
3	87.67 %	72.16 %	66.27 %	88.6 %	94.88 %	66.9 %	63.86 %	96.22 %
4	87.21 %	73.14 %	63.11 %	88.44 %	93.61 %	66.42 %	72.82 %	94.66 %
5	91.23 %	76.51 %	62.92 %	92.47 %	94.82 %	68.17 %	69.66 %	95.92 %
6	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
Avg	-	-	-	-	-	-	-	-

Table 4: Performances of our ingredient extractor in predicting ingredients states for fold 5 with $\lambda = 4$