NUKL at the NTCIR-15 QA Lab-PoliInfo-2 Task *-Dialog Summarization-*

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Our Summarization System

Consists of three modules

- Segmentation
  - using cue phrases
- Sentence Extraction
  - using progressive ensemble random forest
- Sentence Reduction
  - using progressive ensemble random forest

Segmentation

1. Segment text into paragraphs
   - Using cue phrases

Pattern	Regular expressions
Opening	^まず|^最初に|^初めに|^次に|^次いで|^最後に|^終わりに |^[一二三四五六七八九十]+点目 |^[^、]+についてで(す|あります|ございます)(が|けれど) |^終わり(ま|で)す。|^以上で|^ありがとうございま |他の質問に(ついて|つきまして)は
Closing	伺い[^、]*ます。|お尋ね[^、]*します|お答えください。 |(見解|所見|答弁)を求め[^、]*ます。 |(いかがで|どうで)(しょうか|すか)。 |.+質問を(終わります|終了します)。

From K. Kanasaki et al.: Cue-Phrase-Based Text Segmentation and Optimal Segment Concatenation for the NTCIR-14 QA Lab-PoliInfo Task (2019)

Segmentation

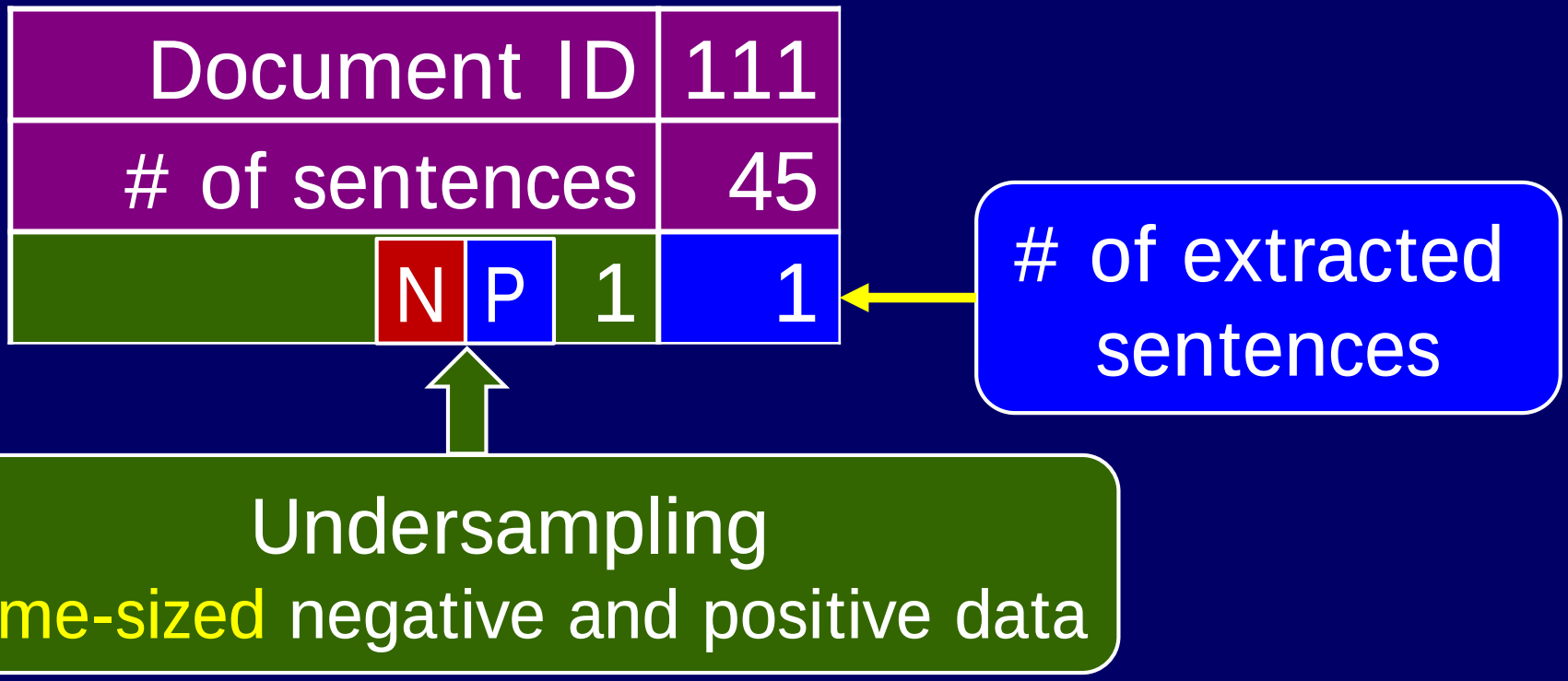
1. Segment text into paragraphs
   - Using cue phrases

2. Choose one paragraph for each subtopic
   - Paragraph including the subtopic
     - Or similar paragraph based on BERT vectorization
   - Considering the orders of the subtopics

Sentence Extraction

- Using
  Progressive Ensemble Random Forest (PERF)
  - developed at NTCIR-14 QA Lab-PoliInfo
  - uses multiple RF classifiers trained on different-sized data step by step

PERF (Progressive Ensemble Random Forest)



PERF (Progressive Ensemble Random Forest)

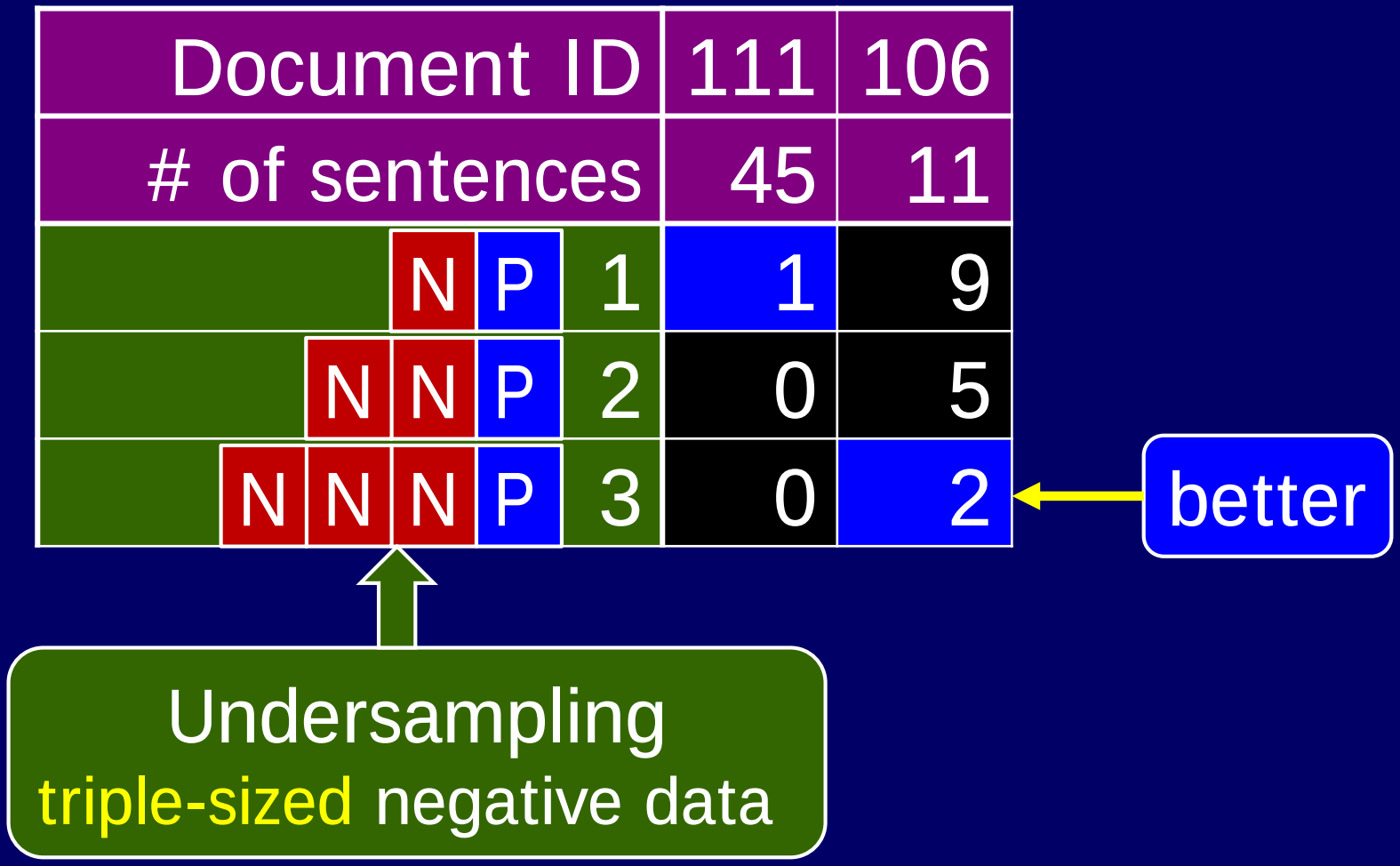
Document ID	111	106
# of sentences	45	11
N P 1	1	9

PERF (Progressive Ensemble Random Forest)

Document ID	111	106
# of sentences	45	11
N P 1	1	9
N N P 2	0	5

Undersampling
double-sized negative data

PERF (Progressive Ensemble Random Forest)



PERF (Progressive Ensemble Random Forest)

Document ID	111	106	23	19	92
# of sentences	45	11	34	8	13
N P 1	1	9	3	7	5
N N P 2	0	5	2	3	3
N N N P 3	0	2	1	3	1
N N N N P 4	0	0	0	1	1
N N N N N P 5	0	0	0	0	1

Which classifier should we use?

All classifiers step by step

Sentence Reduction

- At NTCIR-14 QA Lab-PoliInfo
  - rule based approach
- At NTCIR-15 QA Lab-PoliInfo
  - PERF

Evaluation

ID	Team	Training data	Sentence reduction	ROUGE
148	TO	PoliInfo	Rule	0.2346
216	NUKL	PoliInfo-2	PERF	0.2518

Applying PERF to sentence reduction improved the score

Evaluation

ID	Team	Training data	Sentence reduction	ROUGE
148	TO	PoliInfo	Rule	0.2346
216	NUKL	PoliInfo-2	PERF	0.2518
189	JRIRD	-	-	0.3208

neural network model

Quality Question Scores

ID	team	Content		Well-formed	Sentence goodness	Dialog goodness
		X=2	X=0			
148	TO	0.748	0.671	1.582	0.730	0.488
216	NUKL	0.829	0.747	1.681	0.836	0.616
189	JRIRD	1.082	0.975	1.858	1.129	0.937

Conclusion

- Dialog Summarization task using progressive ensemble random forest
  - for sentence extraction and reduction
  - better results than TO but worth than NN