Learning to Generate Correct Numeric Values in News Headlines

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The Process of Numeric Values from News Articles to Headlines

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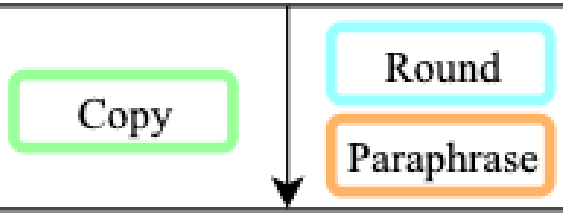
(Article1) FED raises the rates, showing the confidence for economic recovery. This also stimulates the European stock market, especially the export stocks, in which the Germany ones boosts by 2.6%.
(Article2) The numbers of manufacturing are in bad situation, dragging the US stocks to pullback for 24 days. The NASDAQ composite index of technology stocks drops down by 1.67%.
(Article3) Ride-hailing giant Uber released its first safety report on Thursday, disclosing that it received a total of 5,981 reports of sexual assault incidents during its ride-hailing trips in the U.S. in 2017 and 2018.



(Headline1) European Stock Takes a Rides of US Rates Raise. The Germany Stock Rises by 2.6%.
(Headline2) US Manufacturing Stocks Struggle. NASDAQ Composite Collapses by 1.7%.
(Headline3) Uber Discloses Nearly 6K Reports of Sexual Assaults

Methodology

Base Architecture: Character-based Transformer

Two Different Forms:

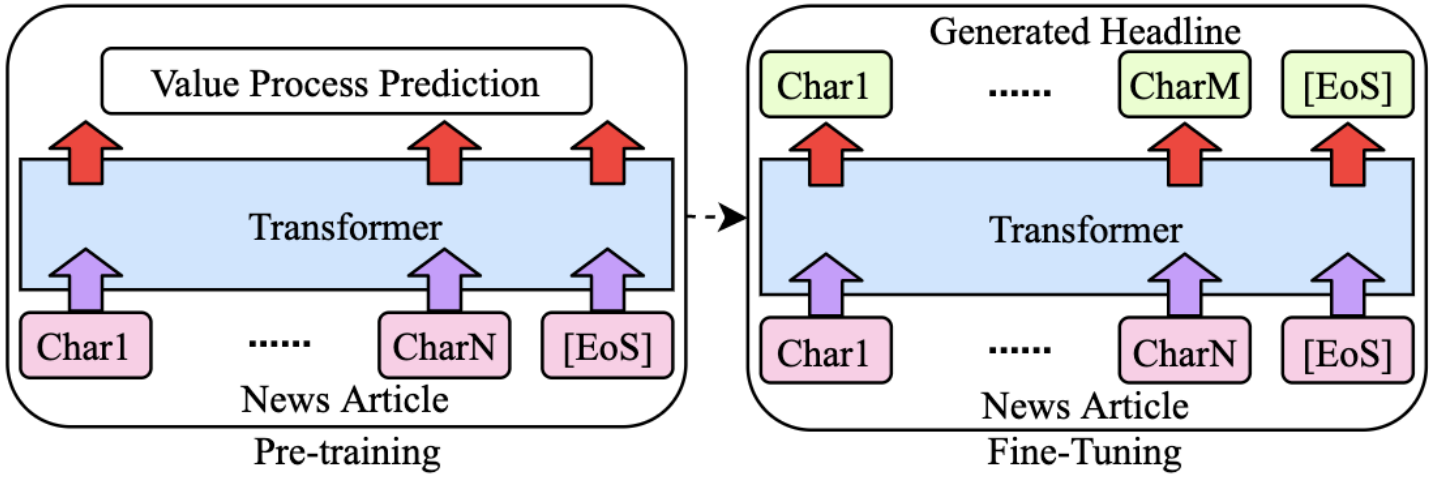
(1) Token: whole value as a token

(2) Digit: represent the value digit by digit.

Two Different Settings:

(1) Numeral Category: year, month, date, percentage, price, and population

(2) Pre-train by Value Process Prediction:



F1 Scores of Numeric Correctness (%)

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Method	From Article	New to Article	Weighted Average
Base Model	45.23	21.28	23.81
w/ Token	**50.76**	18.06	35.71
w/ Token w/o category	49.71	18.74	35.46
w/ Digit	41.37	21.45	32.21
w/ Digit w/o category	39.07	21.63	31.05
w/ Digit + pre-train	45.71	**24.25**	**35.83**

(1) For the numerals copied directly from the news articles, the token-based model performs the best.

(2) For the numerals rounded or paraphrased from the news articles, the proposed pre-train process performs the best.

(3) We also find that add the category information is helpful for the overall results.

Conclusion & Future Work

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- We experiment with various methods to guide the generator to process values from articles for headlines.

- **The proposed pre-train task leads the model to correctly generate numbers** even in the extreme case of target values in headlines are newly generated by rounding and paraphrasing.

- The results show the challenge of these processes, implying the importance of numerical reasoning.

- **Exploring numerical reasoning methods for generative models** is our future work.

Related Events and Datasets

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FinNum-2 in NTCIR-2020

Semantic Understanding

Numeral Attachment:
$NE OK NE, last time oil was over $65 you were close to $8. Giddy-up…

NTCIR

http://finnum.nlpfin.com

FinNLP Workshop in IJCAI-2020

- Submission Deadline: **April 24, 2020**
- The **Best Paper Award** winner: USD$500
- Published at **ACL Anthology**

http://finnlp.nlpfin.com

Related Datasets

Numeracy-600K:
600K Market Comments from Reuters
600K Article Titles from the Web

http://numeracy600k.nlpfin.com

Numeral Understanding:
8,868 Annotations on Financial Tweets
Fine-grained Taxonomy for Numerals

http://numeralunderstanding.nlpfin.com

Please feel free to contact us if you have any questions.

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