Text Similarity using Google Tri-grams

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Outline

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P="An autograph is the signature of someone famous which is specially written for a fan to keep."

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Motivation

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- To develop an unsupervised method

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- To not use any lexical resources

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- To cover a large fragment of the language lexicon

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Resource Used

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Google Web 1T n-gram Corpus

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Number of	Number	Size on disk (in KB)
Tokens	1,024,908,267,229	N/A
Sentences	95,119,665,584	N/A
Unigrams	13,588,391	185,569
Bigrams	314,843,401	5,213,440
Trigrams	977,069,902	19,978,540
4-grams	1,313,818,354	32,040,884
5-grams	1,176,470,663	33,678,504

Examples of Google n-gram Corpus

n=	n-grams	Frequencies
3	he was a	3,683,417
	hehe was a	52
	he was an	563,471
	he was am	121
	he was awesome	7,520
	he was awsome	548
4	he was a vegetarian	1,357
	he was a veritable	454
	he was a very	65,325
	he was a veteran	2,979
5	he was a very generous	276
	he was a very genuine	58
	he was a very gifted	177
	he was a very good	7,447

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Step 1: (Preprocessing)

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Step 1: (Preprocessing)

Text Similarity

$P = \{\texttt{autograph}, \texttt{signature}, \texttt{famous}, \texttt{specially}, \texttt{written}, \texttt{fan}\}$

R="Your signature is your name, written in your own characteristic way, often at the end of a document to indicate that you wrote the document or that you agree with what it says."

Step 1: (Assign the length of P)

$m = |P| = 6$

Text Similarity

P = {autograph, signature, famous, specially, written, fan}

R = {signature, written, characteristic, end, document, wrote, document, agree}
$m = 6$

Step 1: (Assign the length of R)

$n = |R| = 8$

Text Similarity

P = {autograph, signature, famous, specially, written, fan}

R = {signature, written, characteristic, end, document, wrote, document, agree}
$m = 6$, $n = 8$

Step 1: (Find common words in P and R)

Text Similarity

P = {autograph, signature, famous, specially, written, fan}

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Step 1: (Find common words in P and R)

Text Similarity

P = {autograph, signature, famous, specially, written, fan}

R = {signature, written, characteristic, end, document, wrote, document, agree}
$m = 6$, $n = 8$

Step 1: (Find common words in P and R)
$\delta = 2$

Text Similarity

P = {autograph, ~~signature~~, famous, specially, ~~written~~, fan}

R = {~~signature~~, ~~written~~, characteristic, end, document, wrote, document, agree}
$m = 6$, $n = 8$, $\delta = 2$

Step 2: (Remove common words)

Text Similarity

P = {autograph, famous, specially, fan}

R = {characteristic, end, document, wrote, document, agree}
$m = 6$, $n = 8$, $\delta = 2$

Step 3: Construct a 4×6 'similarity matrix'

Text Similarity

P = {autograph, famous, specially, fan}

R = {characteristic, end, document, wrote, document, agree}
$m = 6$, $n = 8$, $\delta = 2$

Step 3: Construct a 4×6 'similarity matrix', M,

$$M = \begin{array}{c} \\ autograph \\ famous \\ specially \\ fan \end{array} \begin{array}{c} \begin{array}{cccccc} characteristic & end & document & wrote & document & agree \end{array} \\ \begin{pmatrix} 0 & 0 & 0.259 & 0.282 & 0.259 & 0 \\ 0.257 & 0.055 & 0.051 & 0.374 & 0.051 & 0.001 \\ 0 & 0.168 & 0.258 & 0.137 & 0.258 & 0 \\ 0 & 0.012 & 0 & 0.203 & 0 & 0.174 \end{pmatrix} \end{array}$$

Text Similarity

P = {autograph, famous, specially, fan}

R = {characteristic, end, document, wrote, document, agree}
m= 6, n= 8, δ= 2

Step 4:

$$M = \begin{array}{c} \\ autograph \\ famous \\ specially \\ fan \end{array} \begin{array}{c} \begin{array}{cccccc} characteristic & end & document & wrote & document & agree \end{array} \\ \begin{pmatrix} 0 & 0 & 0.259 & 0.282 & 0.259 & 0 \\ 0.257 & 0.055 & 0.051 & 0.374 & 0.051 & 0.001 \\ 0 & 0.168 & 0.258 & 0.137 & 0.258 & 0 \\ 0 & 0.012 & 0 & 0.203 & 0 & 0.174 \end{pmatrix} \end{array}$$

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$\rho = \{0.282\}$

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Step 5:

$$S(P,R) = \frac{(\delta + \sum_{i=1}^{|\rho|} \rho) \times (m+n)}{2mn}$$

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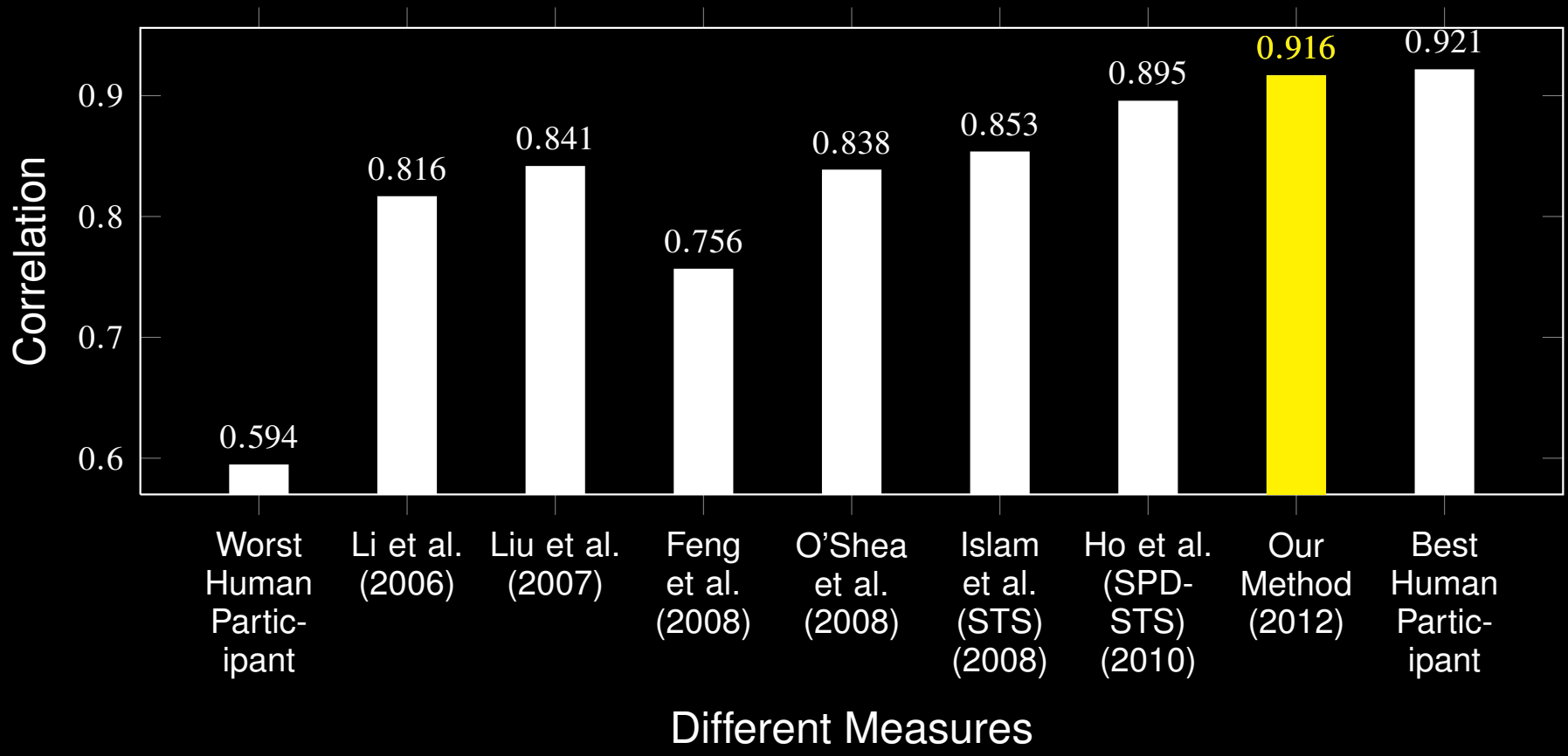
$$S(P,R) = \frac{(\delta + \sum_{i=1}^{|\rho|} \rho) \times (m+n)}{2mn}$$
$$= 0.447$$

Evaluation and Experimental Results



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- To test our method with long documents and in other possible applications

Thanks