

NER: Under the Hood

What is it? How does it work? And how can you use it?



AI-Media's Commitment to Quality Captions

Al-Media is unwavering in its commitment to providing high-quality and accurate captions through the integration of cutting-edge technologies and methodologies, particularly the Number Edition Recognition (NER) system. Recognizing the significance of accessibility and inclusivity in the media landscape, Al-Media has embraced a mission to ensure that their captioning services not only meet but exceed industry standards.

The NER system employed by Al-Media plays a pivotal role in achieving this commitment. NER is a sophisticated methodology that excels in identifying and categorizing entities within text, such as names, locations, dates, and other relevant information. By leveraging the capabilities of NER, Al-Media enhances the accuracy and contextuality of captions, ensuring that viewers receive a comprehensive and nuanced understanding of the content. This system's ability to discern specific entities and their relationships contributes to more precise and contextually relevant captions, addressing the diverse needs of viewers, including those with hearing impairments or language barriers.

Al-Media's choice to utilize the NER system of measurement reflects a strategic commitment to staying at the forefront of technological advancements. This dedication not only enhances the overall quality of our captioning services but also underscores our commitment to promote inclusive and accessible media experiences for all audiences. By embracing such advanced tools, Al-Media remains steadfast in its mission to make information universally accessible and comprehensible, fostering a more inclusive and equitable media landscape.

The Evolution of Caption Accuracy Measurement

Traditionally, the Word Error Rate (WER) model dominated caption accuracy assessments. However, with a growing need for more precise and viewer-centric evaluation, the NER (Number Edition Recognition) model emerges as the new standard, offering a more comprehensive and user-focused approach. Rather than solely taking words spoken vs. words captioned into account, the NER model focuses on overall meaning and idea units. The WER model takes less effort and time to complete, however, it does not provide an unbiased and accurate score of the content. The WER model also provides no details on the nature of errors and further work is therefore required to identify the main source(s) of errors and meaning, which NER accomplishes.



NER: Under the Hood

Introducing NER

Developed by Dr. Pablo Romero-Fresco at the University of Roehampton in the UK, the NER model serves as an objective tool for evaluating live caption quality. Adopted globally, NER is highly repeatable, making it applicable across various industries and services. The NER Model quantifies caption quality and helps AI-Media develop our ASR (Automatic Speech Recognition) solution and products. In addition to sharing NER scores with customers, results and data from hundreds of NERs allows AI-Media to develop LEXI's software, LEXI's Core Dictionary, and Topic Models. We also partner with the founder of the NER model, Pablo Romero-Fresco, to ensure alignment. This allows us to be confident in our evaluation and development of our products, compared to other competitors.

Benefits of the NER System

- Viewer-Centric Focus: NER addresses quality from the viewer's perspective, aligning with exhaustive surveys correlating NER scores with subjective viewer reports.
- Repeatability: Different assessments by various entities yield similar results, enabling the establishment of standardized benchmarks across industries.
- Efficiency: A ten-minute sample analysis can reliably indicate the NER score for the entire program.
- Constructive Feedback: The breakdown of Edition and Recognition errors offers valuable insights for captioners to improve their craft.



NER Measurement in Brief

The NER model calculates the accuracy of live captions through a unique equation, providing a quality score ranging from 0 to 100. A perfect score of 100 indicates flawless captioning.

> 99.5%	Exceptional quality, a seamless viewing experience.
99.0% - 99.5%	Excellent viewing experience, a few glitches but otherwise very clear.
98.5% - 99.0%	Great. Viewer can understand most of the content with some issues.
98.0% - 98.5%	${\bf Good.} {\bf The viewer will concentrate more on the captions than the program.}$
< 98.0%	Needs Work. Caption issues that severely hinder the viewing experience.

What Constitutes a Good NER Score?

The benchmark for quality live captioning is set at 98%, a threshold acknowledged by regulatory authorities worldwide, including the UK's Office of Communications and the Canadian Radio-television, Telecommunications Commission. The United States FCC (Federal Communications Commission), while not stating a specific minimum accuracy % requirement, does have rules that must be adhered to as shown below... Al-Media also meets all these requirements.



How Is NER Calculated?

NER Formula

The NER score is determined using the formula:

NER =
$$100 - \frac{E + R}{N \times 100}$$

where:

- N is the total number of words and punctuation in the captioned piece.
- E is the sum of Edition errors*.
- R is the sum of Recognition errors**.

*Edition errors occur when spoken words are omitted or added incorrectly, while

Definitions:

Number = Number of words and punctuated in a caption piece/transcript

Edition = The sum of edition errors, meaning punctuation errors, formatting errors, or when a word was added or omitted from the caption transcript.

Recognition = Meaning a misspelling.

Notes:

The weightings for errors are as follows:

- 0.0 The discrepancy has no impact on comprehension.
- 0.25 The discrepancy has a small impact on comprehension.
- 0.5 The discrepancy impacts on comprehension.
- 1.0 The discrepancy misleads the viewer with false information.

^{**}Recognition errors involve incorrect words in the captions.



A 0.0 weighting is assigned when spoken filler words such as *you know, at the end of the day, really, I think* are edited from the captions on purpose, or when a phrase is reworded with fewer words but conveys the same meaning.

A 0.25 weighting is assigned to errors such as clear misspellings e.g. *there*, *their*, *they're*, or to capitalization or punctuation errors which lead to confusion.

A 0.5 weighting is assigned to errors such as missing information which would otherwise help the viewer's understanding ("There were road closures in Dunoon today," spoken but missing from the captions) or errors where a word is mistranslated ("...this famous gardener..." represented in the captions as "..this famous guard dog...").

A 1.0 weighting is assigned to errors where the captions may appear to be correct to the viewer, but are actually providing misinformation, such as an incorrect number (1,000 vs. 1,000,000) or the mistranslation of *now* ("Malcolm Turnbull is not the new leader..." instead of "Malcolm Turnbull is now the new leader...")

What is a minor (0.25) error?

Minor errors can be misrecognitions where the intended word can be inferred by the viewer (i.e. 'there' vs 'their'). Minor errors can also be small omissions or misused punctuation. In any case, a minor error may cause the viewer momentary confusion, but it does not obscure the intended meaning.

What is a standard (0.5) error?

Standard errors result in the client missing out on a unit of information. For example, a misrecognition that is so confusing it obscures the intended meaning, or a piece of information that is missing from the captions altogether (including unsuccessful paraphrasing).

What is a serious (1.0) error?

A serious error is one which misleads the client. For example, a misrecognition, paraphrase, or unit of missing information that completely changes the original meaning but appears feasible in the context.

How is the score calculated?

Once all errors have been weighted, NER calculates the accuracy score as follows: Accuracy = Number of words minus total weight of errors divided by number of words multiplied by 100.

In other words, the number of edition and recognition errors is deducted from the total number of words in the live captions. This number is then divided by the total number of words in the verbatim transcript, and finally multiplied by one hundred.



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Viewer-Centric Impact

The NER model prioritizes the viewer's experience by assigning weightings to Edition and Recognition errors based on their impact on comprehension. That is, the NER model is a more holistic approach, taking into account Edition and Recognition errors by evaluating punctuation, text, content, meaning, and circumstance, to ensure that the score is an accurate representation of the quality of captions. Weightings range from 0.0 (no impact) to 1.0 (misleading information), ensuring a nuanced assessment of caption quality.

By focusing on idea units rather than individual words, the NER system aligns with a viewer-centric approach, providing a fair evaluation that benefits both viewers and captioners.

For the most accurate and viewer-friendly captions, trust the NER model – setting a new standard in caption accuracy measurement.

Al-Media Regular NER Reporting Via LEXI Lab

Ai-Media proactively provides its customers with regular quality reporting, including internal reports for product enhancement and development, as well as external reports for our customers that subscribe to our Caption Quality Services. The benefit of regular reporting is that those evaluations can be used to track caption quality over time, develop further Topic Model curation, and for compliance and regulatory obligations. Those recurring evaluations are sent out to the requesting parties, whether internal departments or to our customers. We can evaluate in multiple languages, and a variety of captioning types, including ASR and human-generated content.



Sample NER results for LEXI Automatic Captioning

Live News Broadcast Applications								
NER Score	Region	Topic Model	Total Word Count	Edition Errors	Recognition Errors			
98.77	EMEA	Yes	1,783	8.25	13.75			
99.35	USA	No	1,919	9.5	3			
99.29	USA	No	2,503	9.25	8.5			
99.23	USA	No	1,938	11.5	3.5			
98.53	SPANISH	Yes	1,849	17	10.25			

Sports Broadcast Applications								
NER Score	Region	Topic Model	Total Word Count	Edition Errors	Recognition Errors			
99.06	USA	Yes	1,785	12.25	4.5			
98.79	USA	No	1,648	8.25	13.75			
98.75	CANADA	No	1,582	14.5	5.25			
98.66	CANADA	No	1,823	18	6.5			
98.41	EMEA	No	962	7.5	7.75			
99.42	FRENCH	Yes	1,863	3.75	8.5			

Note: Sample transcripts are provided below for NER results shown above in **bold**





And just lastly, in the United States, the most powerful rocket ever built on earth has launched from southern Texas. Elon Musk's SpaceX sent the new rocket, called Starship, into Space.

The launch was initially successful, but then the booster component didn't separate as planned and exploded into millions of fragments moments later. The SpaceX team describing the moment as a rapid, unscheduled disassembly.

British astronaut Tim Peake congratulated the SpaceX team, however, on Twitter this afternoon, encouraging them to test, learn, and try again.

That's all for me. I'm back in an hour.

Now back to Aberdeen, where Nigel Farage has Farage at Large.

Good evening.

Well, we're live here in Aberdeen tonight with a very enthusiastic crowd. And we're going to discuss all things Scotland.

But to begin a story that some say isn't relevant to Scotland.
You'll often hear people say immigration is only an issue in England,

and yet when you look at the Social Attitudes survey, you find actually people in Scotland are as worried about illegal immigration as people in England are.

LEXI 3.0 CAPTIONS

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We're still gonna start off with quite a bit of cloud coverage tomorrow and then we'll have much less of it on Saturday morning.

We'll get to the sunshine a lot quicker.

And then on Father's Day, we will get a couple degrees cooler. Still staying pretty warm.

We're gonna be close to 80 on Dad's Day.

And then as we head into Monday, slightly cooler.

Temperatures are just gonna be really nice all around and then we'll get a little warmer by the middle of next week.

We have some 80s back in the forecast. I'll send it back to you.

Looks great, Bri. Thank you.

Coming up on Good Morning America, Shannen Doherty gets candid about her cancer journey. The new video before her surgery earlier this year,

and why she's choosing to share it.

Remember, we're always streaming around the clock. Just search for ABC7 Los Angeles wherever you stream and check us out.

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Ya por primera vez, y digo sin precedente, el sur de California desde Los Angeles hasta San Diego, lanza esa vigilancia por tormenta tropical que estaría llegando a partir del domingo por la noche hasta el próximo lunes por la tarde y también toda esa estela que deja de inundación en zonas desérticas montañosas y especialmente en la zona limítrofe, es decir, la zona donde quedan Las Vegas, allá en Nevada, por supuesto, también parte de Arizona y también parte de California.

Ahí están ya las advertencias por este poderoso huracán, su desplazamiento hacia el norte sigue con esos vientos de 130 millas por hora. Recuerde que cuando bajan a 129 ya entra en categoría tres. Se espera que lo único que lo pare son las aguas más frescas, más frías hacia el norte.

Por lo tanto, estaría siendo categoría tres a partir de mañana, pero va a continuar su paso precisamente por la Biosfera Vizcaína.

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BOTH BICKERSTAFF AND FINCH WOULD BE ON THE SHORT LIST
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>> I KNOW WE'RE MISSING SOME FOLKS, BETH, BUT I'M EXCITED FOR THIS ONE. TWO TEAMS THAT HANG THEIR HAT ON THE DEFENSIVE END. AS YOU SEE JARRETT ALLEN, IT'S A BATTLE OF CENTERS.

>> YES.

- >> YOU SEE THE GUYS THAT ARE GOING TO JUMP IT UP AND MAN, WHAT DOES HE HAVE FOR US AFTER LAST NIGHT MAN.
- >> OTHER THAN A BUMP ON THE BACK OF HIS HEAD,
 HITTING THE RIM AND THEN THE TEN FOOT FREE FALL AFTER THAT
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>> Yeah. And I can't believe it's been almost 20 years since that happened. I was there, you know, Andy. And here was Kyle Shewfelt, young guy, came out of the Altadore Gymnastics Club in Calgary, Alberta. He had a great coach by the name of Kelly Manjak.

Kyle looked a little bit different back then. He had a brush cut. We're used to seeing the blond curly locks, but, you know, things change over time.

- >> I do not let him live down, by the way, that eyebrow piercing. But here's the thing, not only were you there and you witnessed that gold medal winning performance live, you actually called it. Let's walk down memory lane.
- >> There he is, the 22-year-old from Calgary, Alberta. A member of the Altadore Gymnast Club. Kyle won the bronze medal at the World Championships. Kyle Shewfelt has always been about clean lines, about impeccable execution. Last pass crucial.
- >> So important for him to nail this one. He does!
- >> Canada has never won a medal in artistic gymnastics.

LEXI 3.0 CAPTIONS

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Dix ans à Vannes, de 28 ans à 38 ans, il a pris d'abord la réserve, ensuite il était en N2. Il les a fait monter jusqu'en Ligue 2.

Même en finale de Coupe de la Ligue, Vannes face à Bordeaux, en 2009. Descendu après avec Vannes avec 44 points.

C'est vous dire que jamais l'abri quand même.

C'était une année à trois descentes et ils sont les derniers à descendre avec 44 points. Difficiles de se prononcer, mais en tout cas, il a été bien, bien enturbanné là. Julien Masson et il va y avoir encore deux changements supplémentaires côté valenciennois. Et bien sûr, Julien Masson est l'un des joueurs remplacés. Petit commotion ou grosse commotion? On verra. En tout cas, il a l'air d'être à peu près normal dans sa, sa démarche et il parle aussi à des assistants.

Donc ça c'est quand même relativement bon signe.

Double changement en tout cas à suivre. Allez, c'est parti!

Il y a eu un très long arrêt de jeu, donc il y aura beaucoup
de temps additionnel. Boutoutaou qu'il a bien dosé du gauche.
Ce coup franc en retrait Hamache.

Attention, c'est perte de balle avec Mouazan.

Mouazan qui tricote bien tourner autour avec Philiponeau.

LEXI 3.0 CAPTIONS

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For more LEXI NER results and examples of content for each test, scan the QR code below.



