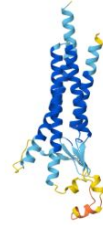


ARGOS: A Retrieval-augmented GeneratiOn approach for Scientific communication

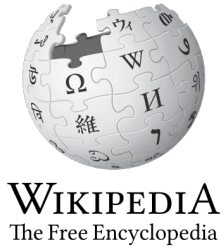
Daniele Di Bella

CNR-IBBA, Fondazione Telethon

10 Tdark proteins, the origin of ARGOS

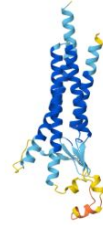


- **known sequences** in UniProt
- **little or no** info on **function**
- **little or no** info on **ligands** or **drugs**

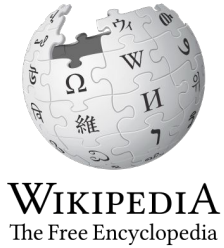


Kelleher J. K. *et al.*, 2022; Lewis P. *et al.*, 2021; Márquez C. M. and Porras M. A., 2020; Nerlich B., 2017; Rose M. K. *et al.*, 2020

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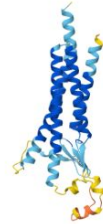


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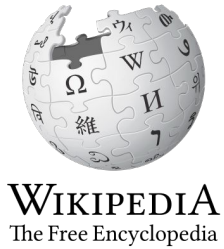


Can LLMs help scientific communication and foster public outreach?

10 Tdark proteins, the origin of ARGOS



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Can LLMs help scientific communication and foster public outreach?



Peer pressure



Time consuming



Not rewarding



EN hegemony



RAG

Fast

Accurate

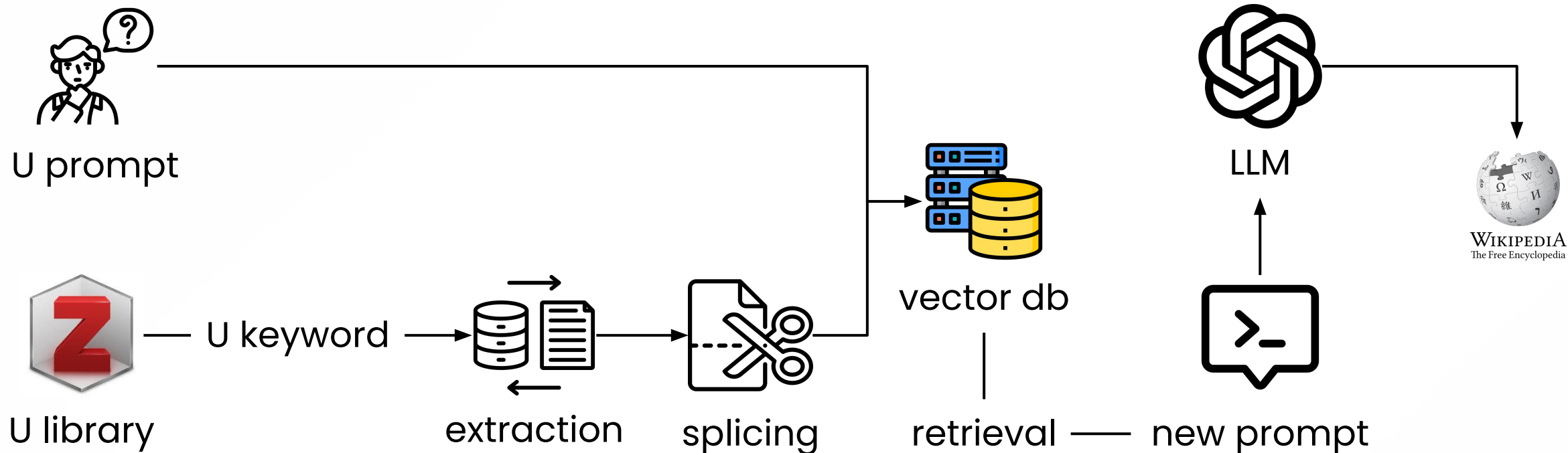
Multilingual

What is RAG and how does ARGOS work?

“RAG models [...] combine pre-trained parametric and **non-parametric memory** for language generation.”

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Lewis P. et al., 2021

Results example and first validation

GPR179 – EN

ID code: 01 GPR179 – IT

ID code: 02

GPR179 is a member of the G protein-coupled receptor (GPCR) superfamily, specifically classified within class C of the GPCRs. Unlike many other GPCRs, GPR179 is considered an orphan receptor because its endogenous ligand has not yet been identified. This protein plays a crucial role in the visual system, particularly within the retina, where it is essential for the proper functioning of ON-bipolar cells, which mediate the depolarizing response to light and are central to scotopic (low-light) vision [2, 10]

GPR179 è un recettore orfano appartenente alla superfamiglia dei recettori accoppiati a proteina G (GPCR), classificato all'interno della classe C dei GPCR. Questo recettore gioca un ruolo fondamentale nella trasduzione del segnale visivo, soprattutto all'interno delle cellule bipolari ON della retina dei mammiferi, ed è noto per la sua implicazione nella visione crepuscolare (scotopica) [2, 10]

[2] W. Bachert et al. "Homodimerization of a proximal region within the C-terminus of the orphan G-protein coupled receptor GPR179". In: *Neurochemistry International* 149 (2021), p. 105150. DOI: [10.1016/j.neuint.2021.105150](https://doi.org/10.1016/j.neuint.2021.105150).

[10] Y. Yun et al. "Cryo-EM structure of human class C orphan GPCR GPR179 involved in visual processing". In: *Nature Communications* 15.1 (2024), p. 8299. DOI: [10.1038/s41467-024-52584-z](https://doi.org/10.1038/s41467-024-52584-z).

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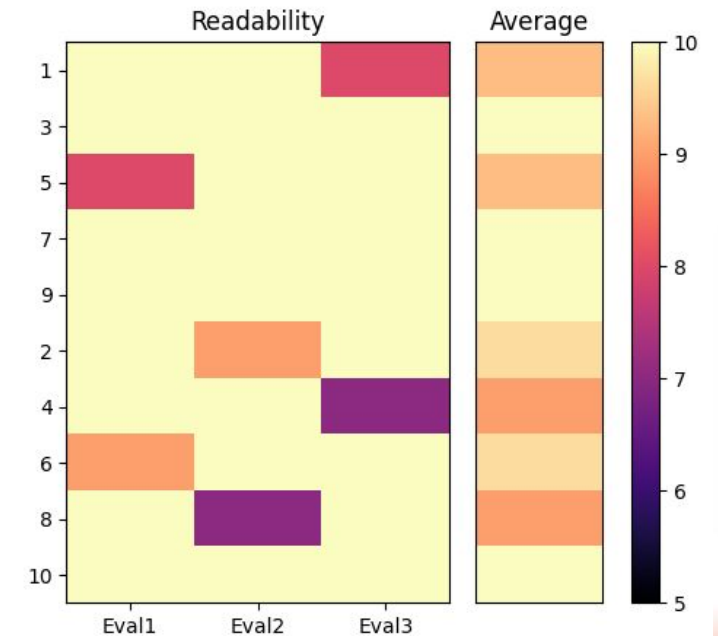
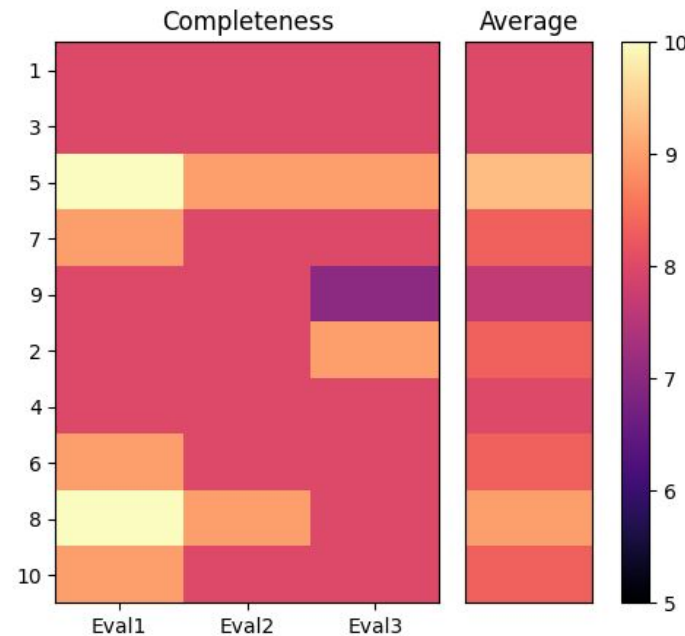
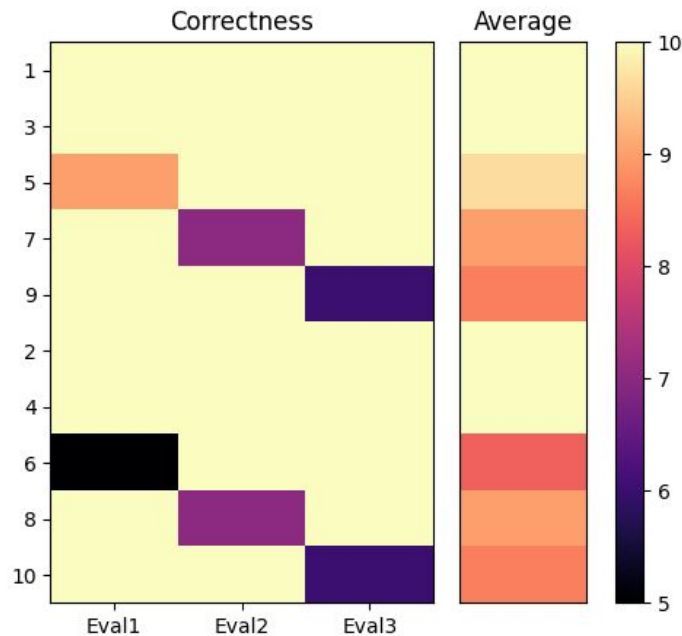
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Future perspectives

- ✓ Validation with broader samples

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😊 Possibility to use local models

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- 😊 Possibility to use local models
- 💬 Multi-turn conversational interaction

Future perspectives

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We are open to 💡 ideas and 🤝 collaborations

Thank you

UniCH

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UniMI

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CNR-IBBA

Pietro Roversi