# PROPOSAL FOR PORQUE: A POLYLINGUAL HYBRID QUESTION ANSWERING SYSTEM

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### Motivational example: What types of human activities endanger birds?



Hispaniolan (Ama-The zona ventralis), colloquially known as cuca, is a species of Amazon parrot in the family Psittacidae. It is threatened in its home range by habitat loss and the capture of individuals for the pet trade.

#### **Corpus:**

hormiguerito El del Paraná (Formicivora acutirostris) es una especie de ave paseriforme de la familia Thamnophilidae. Mucho de su hábitat se encuentra en estado de degradación, y es amenzado por el uso del suelo para agricultura, industria y habitación

Agriculture, urban and

some activities which

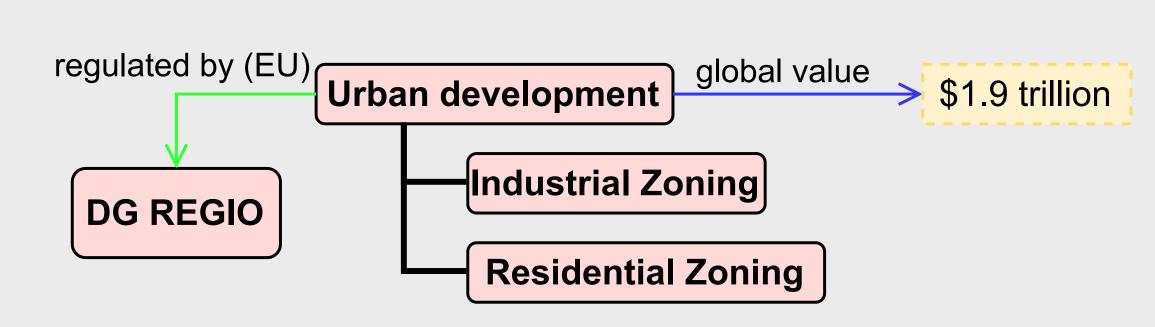
endanger birds.

industrial development,

pet trade and logging are

The madanga (Anthus ruficollis) is a species of bird endemic to the Indonesian island Buru. Because the species are restricted to a single island and its habitat is threatened by logging and land conversion for cattle farming, it is listed as endangered by the IUCN.

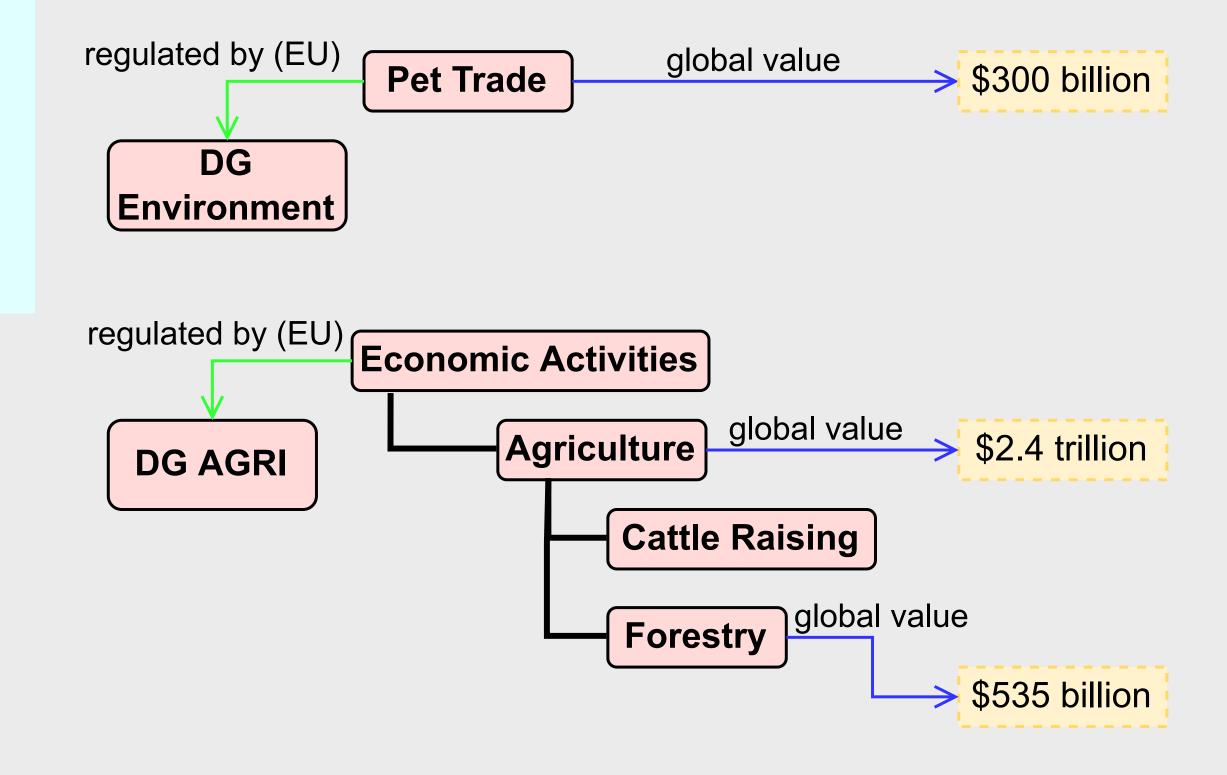


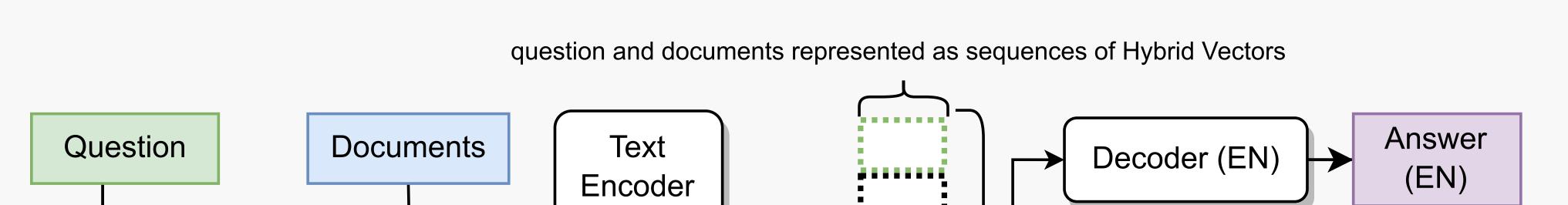


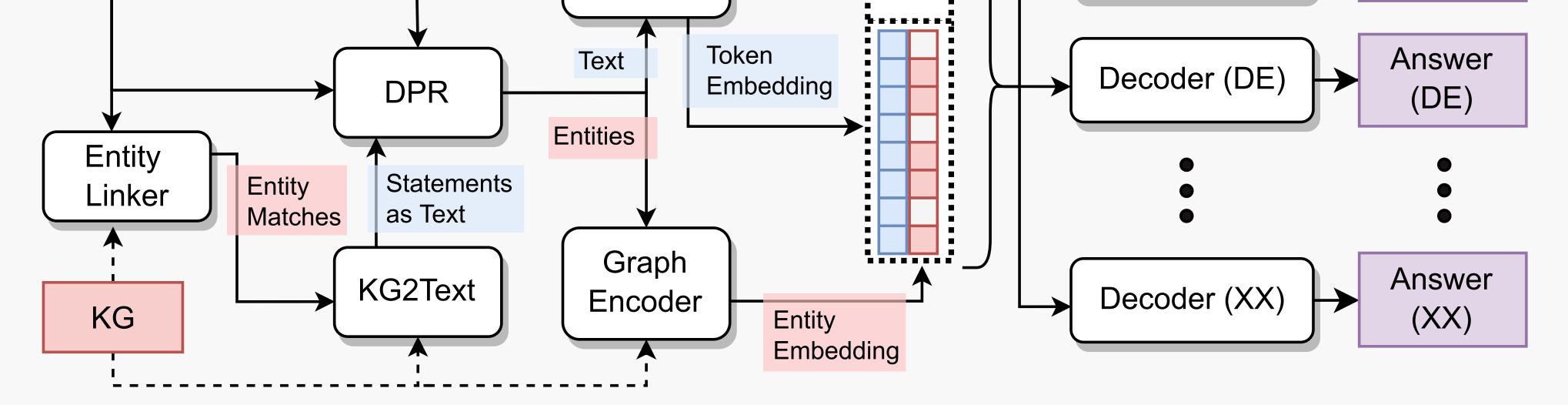
#### **Knowledge Graph:**









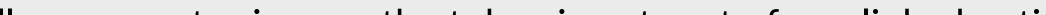


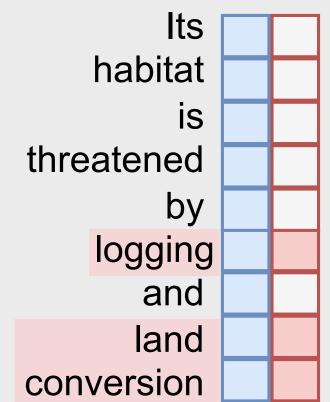
### The Hybrid Vectors

In PORQUE, answers are generated based on the *hybrid vectors* that represent information present both in the documents and in the graph.

Each of these vectors corresponds to a token in a paragraph, and results from the combination (e.g., concatenation) of two components:

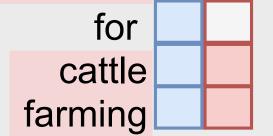
1.		The contextualized, multilingual embedding of the toke	n by the	Text Encoder.
2.	Eitl	ither		





the all-zeros vector in case the token is not part of any linked entity

the graph-embedding as provided by Graph Encoder in case it is the start of an entity mention



### **Other Approaches**

- Late Fusion: Data-source specific ML systems are used to produce answers, which are then combined.
- Early fusion: Data sources is are integrated before the inference step.
- Text2KG: Take all documents and convert it into triples. Then use methods for Question Answering over Linked Data to generate queries on the KG.
- KG2Text: Generate natural language documents from triples. Then use methods for Question Answering over Documents to find spans containing the answer.

### **Our Proposal**

- Hybrid: Information from both documents and knowledge graph is combined to generate the answer.
- **Polylingual**: The sources of information, the question, and the answer can all be in different languages.
- Generative: The answer is not explicitly contained in any of the sources of information, instead it is generated using a Language Mode.
- **Robust**: The approach also works with a single source of information.