Nomination: 18722

PETRONAS's Exploration & Development Intuitive Search (EDIS) Revolutionizes Upstream

## Page: General Information

### Name of Organization / Company
Petronas Digital Sdn. Bhd.

### Logo
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### Web Site Address
https://www.petronas.com/ (https://www.petronas.com/)

## Page: Entry Information

### Entry Title
PETRONAS's Exploration & Development Intuitive Search (EDIS) Revolutionizes Upstream

### Category
N01 - N03 - Award for Innovation in Technology > N01. Award for the Innovation in Technology Development > All Other Industries

### Submission Format
An Essay of up to 625 Words

### Essay

Imagine finding the perfect fossil in seconds. PETRONS Digital Sdn Bhd, the technology innovators of the PETRONAS Group, unleashes breakthroughs which allow the geoscientists to experience data like never before with its groundbreaking Exploration & Development Intuitive Search (EDIS). This novel system, powered by an ontology-model AI, has transformed information retrieval, boosting Process Cycle Efficiency (PCE) by 80% and slashing geological analysis from 5 days to 1 day.

Upstream Exploration involves navigating vast amounts of data across multiple departments, often leading to inefficient searches and lengthy wait times. This fragmented landscape hampered decision-making, causing delays and potential missed opportunities. PETRONAS EDIS system tackled these challenges head-on, empowering geoscientists to ask questions in natural language, access data seamlessly and get results instantly. This intuitive interface removes technical barriers, allowing geoscientists to focus on exploration, not data wrangling.

Large Language Models (LLMs) are attracting an enormous amount of interest now in many domains. Their general nature, and ability to "understand" natural language, has already stimulated multiple areas of research at our company. Here we successfully demonstrate a Natural Language querying system, which can search a large repository of unstructured exploration data. The system supports follow up querying on the returned results, plus automatic summarization of content.

The system is integrated into our novel end-to-end data-mining platform, which continuously mines our unstructured exploration data for new changes and indexes the results. Important in our method are the enrichment processes that occur prior to use of the LLM. Our approach avoids usual "chunking" techniques, which in our experience results in inferior results, especially in the multiple domain areas of Exploration. By integrating our novel ontology-model AI in the enrichment of the initial Index, we drastically boost the performance of search resulting from the LLM steps.

To perform the search, key parts of our unstructured data, plus the query itself, need to be transformed into a vector form. This is performed using the embedding feature of the LLM. For this work, we had around 500,000 embeddings to calculate. To improve performance these were indexed in a leading Analytics Engine as a vector object, allowing fast search via cosine or Euclidian similarity. A custom dashboard was made to allow fresh searches of the vector datastore to be returned for further analysis.

Our current search time across 500,000 embeddings is under 20 milli-seconds. Our custom dashboard returns the top matches for further interrogation and analysis. This includes follow-up Natural Language question support on the returned matches for summarization tasks and other customized querying. Since our exploration-specific, ontology model can tag each piece of data with over 40 exploration-specific labels, we are able to cross-examine the LLM returned results with the tags. Agreement on a range of queries – ranging from targeted, highly specific questions to general, open-ended queries – was surprisingly good.
Natural Language based querying of our unstructured data is opening a whole new approach to data discovery in our company. Tailoring it to the exploration domain has required specific domain expertise and a novel ontology-model be used to ensure relevant prompts and query results. Obtaining search results quickly has also required expertise and fine-tuning.

PETRONAS's EDIS system is not just a solution, it's a springboard for future innovation. Plans include ingesting more data sources, scaling the supporting infrastructure, and enhancing system capabilities. This dedication to continuous improvement ensures PETRONAS Digital remains at the forefront of digital transformation in exploration.

PETRONAS's EDIS system is a shining example of how digital transformation can revolutionize industries. By empowering geoscientists with intuitive and efficient access to data, it has demonstrably improved exploration efficiency, accuracy, and user experience. By championing user-centric technology and pushing the boundaries of AI, PETRONAS has secured its rightful place as a leading innovator in the industry.

**For this category please provide**

An essay of up to 625 words describing the nominee's innovative achievements in technology since July 1 2021, **OR** a video of up to five (5) minutes in length illustrating the same.

Optional (but highly recommended), a collection of supporting files and web addresses that you may upload to our server to support your entry and provide more background information to the judges.

**Do You Have Supporting Files You Would Like to Upload?**

Yes

Audio (Mp3), Documents (PDFs, Word, PowerPoints), Images (PNG, JPG, TIF), and Video (Mp4)

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