FrenchMedMCQA: A French Multiple-Choice Question Answering Dataset for Medical domain

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Summary

Context

- **Multiple Choice Question Answering (MCQA) Task:** Selection of the correct candidates (one or more) regarding a question
- **Few** resources **available** in the biomedical field
- Data mainly in **English** and **Chinese**

Difficulties

- MCQA is one of the **most difficult NLP** tasks
- Requires **advanced reading comprehension skills** and **external sources of knowledge**
- Freely available textual data are **rare** for biomedical domain

Contributions

- **SOTA models** for biomedical multiple-choice question answering in French
- An **external passage retriever** from various biomedical textual sources
- An **open** corpus, including tools and models, all available online

Corpus and Tools distribution

github.com/qanastek/FrenchMedMCQA

FrenchMedMCQA-BART-base-Wikipedia-BM25
FrenchMedMCQA-BioBERT-V1.1-Wikipedia-BM25

qanastek/FrenchMedMCQA

Corpus creation and Evaluation

- Collected from **real French pharmacy exams** (remede.org)
- Questions and answers **manually created** by medical experts and used during examinations
- Contains an identifier, a question, five options and correct answer(s)

# Answers	Training	Validation	Test	Total
1	595	164	321	1,080
2	528	45	97	670
3	718	71	141	930
4	296	30	56	382
5	34	2	7	43
Total	**2,171**	**312**	**622**	**3,105**

Multi-label tasks need different metrics, since an observation can be partially correct:

$$\textbf{Exact Match Ratio (EMR)} \rightarrow \frac{\text{Number of fully correct questions}}{\text{Total number of questions}}$$

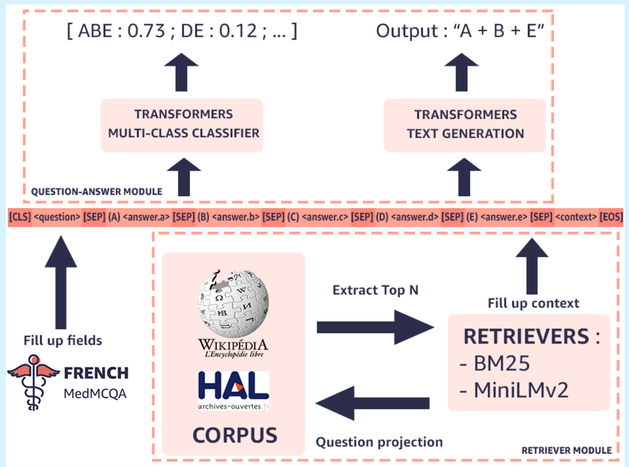
$$\textbf{Hamming Score} \rightarrow \frac{1}{N} \sum_{I \in \text{Corpus}} \frac{I_{Truth}}{I_{Pred} + I_{Ref}}$$

State of the art MCQA system

Discriminative representations:

- *CamemBERT*, a generic French pre-trained language model based on *RoBERTa*
- Medical domain pre-trained representations in English *BioBERT* and *PubMedBERT*

Generative representation: Prompting with *BART*



External medical-related corpus in French from two online sources:

- **Wikipedia** life science in French
- **HAL** papers and thesis from various specializations, such as:
  - *Human health and pathology*
  - *Cancerology*
  - *Public health and epidemiology*
  - *Immunology*
  - *Pharmaceutical sciences*
  - *Psychiatric disorders*
  - *Drugs*

1 million passages (at least 100 characters) from HAL and **286K** from Wikipedia.

	Without Context		Wiki w/ BM25		HAL w/ BM25		Wiki w/ MiniLMv2		HAL w/ MiniLMv2	
Architecture	**Hamming**	**EMR**	**Hamming**	**EMR**	**Hamming**	**EMR**	**Hamming**	**EMR**	**Hamming**	**EMR**
BioBERT V1.1	36.19	15.43	**38.72**	16.72	33.33	14.14	35.13	16.23	34.27	13.98
PubMedBERT	33.98	14.14	34.00	13.98	35.66	15.59	33.87	14.79	35.44	14.79
CamemBERT-base	36.24	16.55	34.19	14.46	34.78	15.43	34.66	14.79	34.61	14.95
XLM-RoBERTa-base	37.92	17.20	31.26	11.89	35.84	16.07	32.47	14.63	33.00	14.95
BART-base	31.93	15.91	34.98	**18.64**	33.80	17.68	29.65	12.86	34.65	18.32

Conclusion and Perspectives

- ***BioBERT V1.1*** reaches best performance on *Hamming score* and ***BART-base*** for *EMR*
- Best performing models are based on domain **specific English** words representations while **being applied on French**
- SOTA domain **specific models** outperform generic language specific model
- Future work: propose an open French language model specialized on biomedical domain, still doesn't exist

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