

A Practical Toolkit for Multilingual Question and Answer Generation

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ACL 2023 System Demonstration



<https://github.com/asahi417/lm-question-generation>

Question & Answer Generation

Paragraph

Dante Gabriel Rossetti, was an English poet, painter, and member of the Rossetti family. He founded the Pre-Raphaelite Brotherhood in 1848 with William Holman Hunt and John Everett Millais. Rossetti was later to be the main inspiration for a second generation of artists and writers influenced by the movement, most notably William Morris and Edward Burne-Jones.

Question & Answer

Q: What was Dante Gabriel Rossetti's career?

A: *poet, painter, and member of the Rossetti family.*

Q: What group did Dante Gabriel Rossetti found in 1848?

A: *Pre-Raphaelite Brotherhood*

Q: Along with Edward Burne-Jones, who was influenced by the Pre-Raphaelite Brotherhood?

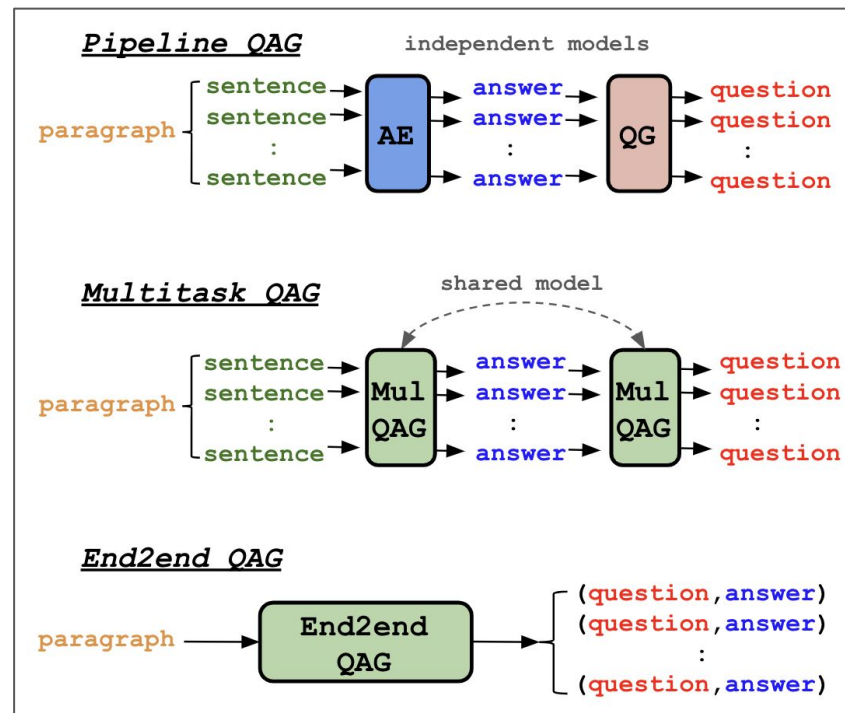
A: *William Morris*

Three QAG Approaches

- **Pipeline QAG**
 - QG + AE (Separate Model)
 - Prediction per sentence
- **Multitask QAG**
 - QG + AE (Shared Model)
 - Prediction per sentence
- **End2end QAG**
 - QAG (Single Model)
 - Prediction per paragraph

*QG: Question Generation

*AE: Answer Extraction



Three QAG Approaches

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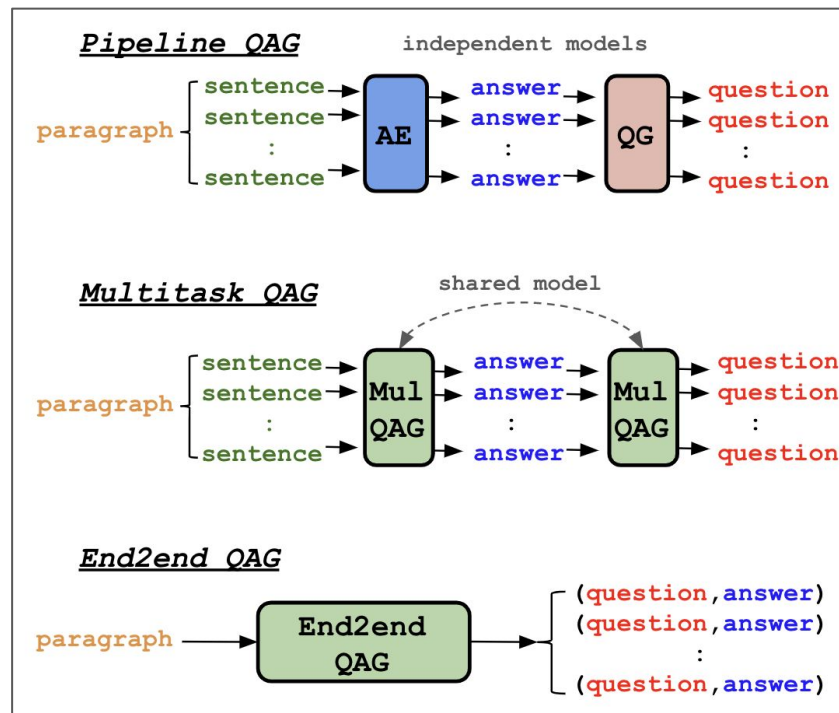
- **Multitask QAG**

- QG + AE (Shared Model)
- Prediction per sentence

- **End2end QAG**

- QAG (Single Model)
- Prediction per paragraph

- Slow Inference
- More Storage
- More QA Pairs
- Stable across languages



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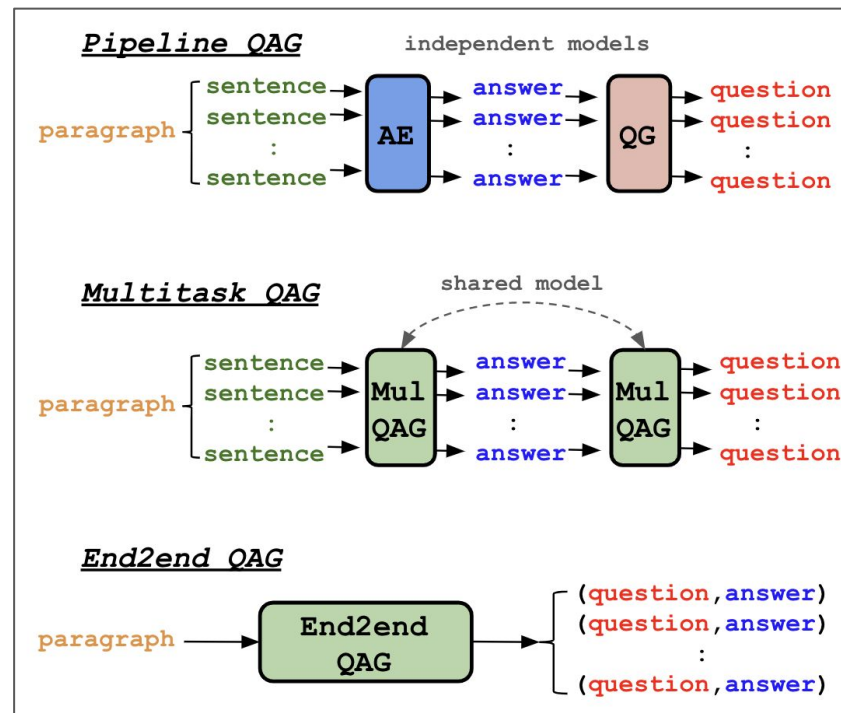
- Slow Inference
- Low Storage
- More QA Pairs
- Not the best in some languages

- **End2end QAG**

- QAG (Single Model)
- Prediction per paragraph

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Three QAG Approaches

● Pipeline QAG

- QG + AE (Separate Model)
- Prediction per sentence

- Slow Inference
- More Storage
- More QA Pairs
- Stable across languages

● Multitask QAG

- QG + AE (Shared Model)
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- Not the best in some languages

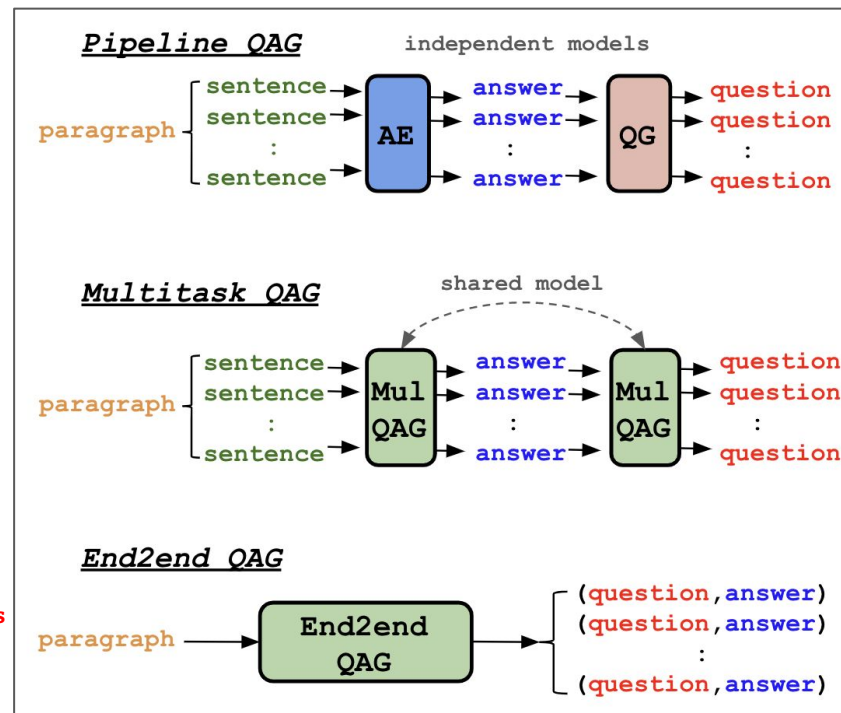
● End2end QAG

- QAG (Single Model)
- Prediction per paragraph

- Fast Inference
- Low Storage
- Less QA Pairs
- Failure in some languages

*QG: Question Generation

*AE: Answer Extraction



lmqg: A Python Library for QAG

- What I can do with *lmqg*? 🤔
 - QA Generation with fine-tuned models in 8 languages En/Ja/Es/Fr/De/It/Ru/Ko.
 - Check available models at [MODEL CARD](#) or <https://huggingface.co/lmqg>.
 - QAG model training/evaluation.
 - Check available datasets at <https://huggingface.co/lmqg>.
 - Rest API for QA Generation.

- Link → <https://github.com/asahi417/lm-question-generation>



Examples of *lmqg*

```
from lmqg import GridSearcher

# instantiate AE trainer
trainer_ae = GridSearcher(
    dataset_path="lmqg/qg_squad",
    input_types="paragraph_sentence",
    output_types="answer",
    model="t5-large")

# train AE model
trainer_ae.train()

# instantiate QG trainer
trainer_qg = GridSearcher(
    dataset_path="lmqg/qg_squad",
    input_types="paragraph_answer",
    output_types="question",
    model="t5-large")

# train QG model
trainer_qg.train()
```

(i) Model Training

```
from lmqg import QAAignedF1Score

# gold reference and generation
ref = [
    "question: What makes X?, answer: Y",
    "question: Who made X?, answer: Y"]
pred = [
    "question: What makes X?, answer: Y",
    "question: Who build X?, answer: Y",
    "question: When X occurs?, answer: Y"]

# compute QAAigned BS
scorer = QAAignedF1Score(
    base_metric="bertscore")
scorer.get_score(pred, ref)

# compute QAAigned MS
scorer = QAAignedF1Score(
    base_metric="moverscore")
scorer.get_score(pred, ref)
```

(ii) Model Evaluation

```
from lmqg import TransformersQG

# instantiate model
model = TransformersQG(
    model="lmqg/t5-base-squad-qg",
    model_ae="lmqg/t5-base-squad-ae"
)

# input paragraph
x = """William Turner was an English
painter who specialised in watercolour
landscapes. One of his best known
pictures is a view of the city of
Oxford from Hinksey Hill.""

# generation
model.generate_qa(x)
[
    (
        "Who was an English painter
        specialised in watercolour
        landscapes?",
        "William Turner"
    ),
    (
        "Where is William Turner's
        view of Oxford?",
        "Hinksey Hill."
    )
]
```

(iii) QA Generation

Rest API for QA Generation with *lmqg*

Build

- Build/Run Local (command line):

```
export API_TOKEN={Your Huggingface API Token}
uvicorn app:app --reload --port 8088
uvicorn app:app --host 0.0.0.0 --port 8088
```

- Build/Run Local (docker):

```
docker build -t lmqg/app:latest . --build-arg api_token={Your Huggingface API Token}
docker run -p 8080:8080 lmqg/app:latest
```

API Description

You must pass the huggingface api token via the environmental variable `API_TOKEN` . The main endpoint is `question_generation` , which has following parameters,

Parameter	Description
<code>input_text</code>	input text, a paragraph or a sentence to generate question
<code>language</code>	language
<code>qg_model</code>	question generation model
<code>answer_model</code>	answer extraction model

AutoQG <https://autoqg.net/>



- Multilingual
 - En/Ja/Es/Fr/De/It/Ru/Ko
- Switch QAG Type:
 - Pipeline/End2end/Multitask
- Switch LMs
 - T5/BART/Flan-T5
- QG mode: Specify Answer

The screenshot shows the AutoQG web interface. At the top, there's a navigation bar with the AutoQG logo, a language selector set to 'English', and icons for home, menu, and mobile. The main heading is 'Write QA with AI'. Below it, instructions state: 'Select LANGUAGE on the right top tab, TYPE into the text box, and click RUN to get question & answer generated by AI.' A text input area contains a sample document about Francis Bacon. Below the input, there are dropdown menus for 'QAG Model' (Default), 'QAG Type' (Default), and 'Split' (Paragraph). A slider is visible below the dropdowns. At the bottom of the input section are three buttons: 'Reset', 'Example', and 'Run'. The output section, titled 'Generated QA Pairs', shows three examples of generated questions and answers with their respective confidence scores.

AutoQG English

Write QA with AI

Select LANGUAGE on the right top tab, TYPE into the text box, and click RUN to get question & answer generated by AI.

Enter text or press 'Example' below to try sample documents.

Francis Bacon (28 October 1909 – 28 April 1992) was an Irish-born British figurative painter known for his raw, unsettling imagery. Focusing on the human form, his subjects included crucifixions, portraits of popes, self-portraits, and portraits of close friends, with abstracted figures sometimes isolated in geometrical structures. Rejecting various classifications of his work, Bacon said he strove to render "the brutality of fact." He built up a reputation as one of the giants of contemporary art with his unique style.

[Optional] Specify an answer... QAG Model: Default QAG Type: Default Split: Paragraph

Reset Example Run

Generated QA Pairs

Copy to clipboard! 📄

What was Francis Bacon's profession?
Irish-born British figurative painter
Confidence: 0.22

What did Bacon say about his work?
he strove to render "the brutality of fact."
Confidence: 0.21

What type of figures were sometimes isolated in geometrical structures?
abstracted figures
Confidence: 0.19

What did Bacon build up a reputation as?
giants of contemporary art
Confidence: 0.16

Thank you!!