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Learning from On-Line User Feedback in Neural Question Answering on the Web

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THE WEB CONFERENCE

FOR MORE BACKGROUND OR THE SOURCE CODE PLEASE CONTACT US

1 Introduction

- Question-answering systems have been **static and can thus not learn** over time
- Our work presents the **first feedback mechanism where neural question-answering continues to learn.**
- For this, **only simple user feedback is necessary**, yet achieving substantial performance increases.

2 Challenges

Noisy or Adversarial Feedback

We must consider the characteristics of user feedback on the web, namely the **possibility of errors and even malicious feedback**.
→ *See 7/8*

Catastrophic Forgetting

Catastrophic forgetting describes the phenomenon whereby **models forget what they have learned earlier**; while learning new tasks, the performance on tasks that have already been learned decreases dramatically.
→ *See 6*

Multi-Component Architecture

State-of-the-art neural QA systems are composed of **complex multi-staged operations**.
→ *See 3*

3 The QApedia Framework

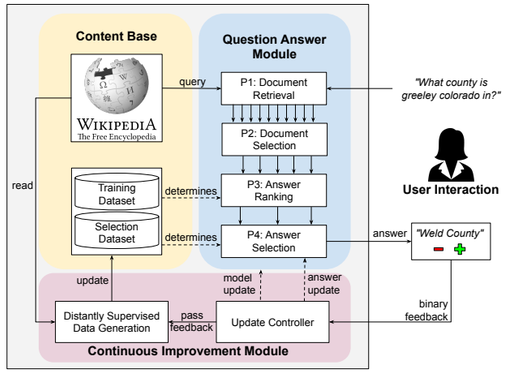


Fig. 1. Architecture of our QApedia framework.

4 Continuous Improvement

Convert **positive feedback to new data sample**s and asynchronously retrain the model:

1. **Gather evidence** from Wikipedia
2. Rigorously **filter the evidence** for credibility
3. **Make decision** on the correctness of the feedback
4. If we believe the feedback: use distantly supervised data generation to **generate a high quality data sample**

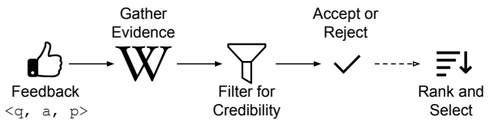


Fig. 2. Continuous improvement steps.

5 Experimental Setup

We use two different data corpora to benchmark

- **the ability of continuous learning** and
- **the robustness against forgetting**

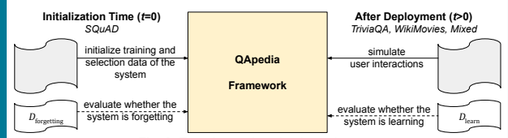
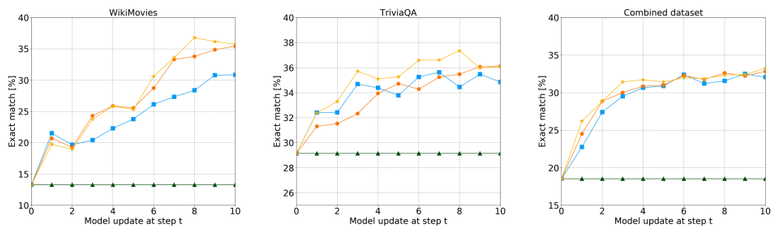


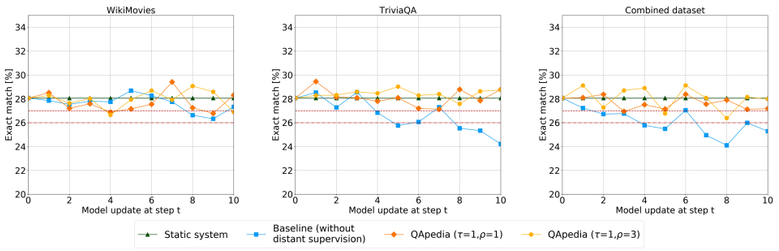
Fig. 3. Experimental evaluation scheme.

6 Improvements with Clairvoyant Users

Learning effect on samples from an unseen domain.



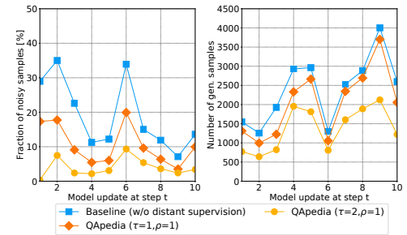
Forgetting effect on the original domain. *Why is this happening?* → *See 7*



7 Insights

Insight 1: Distant supervision improves quality of data when the feedback is correct.
Number of uninformative samples:

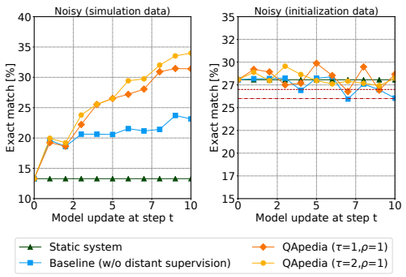
- Baseline without DS: 13%
- With DS: 4%



Insight 2: Distant supervision filters incorrect, noisy or adversarial feedback very well.

8 Noisy User Feedback

Feedback is usually not correct in web-based settings. We evaluate **the robustness under extreme conditions**, where ~18% of all up-votes are noisy.



9 Discussion / Conclusion

- Continuous learning from feedback can **bolster the performance considerably**.
- Improvement from shallow **binary feedback is considerably less costly** than asking to provide ground-truth labels.
- Distant supervision combined with data-driven learning is very **robust and suitable for web-based settings**.

References

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