Figure 2: Average reward obtained in each round for each agent

Conclusions

We have proposed an optimality criterion for decision making under uncertainty when the environment where the agent is situated is governed by an unknown causal mechanism. This criteria, when used to build a decision making procedure yields similar performance as classical algorithms which aim towards the same objective: maximizing expected utility, thus showing that causal information, and causal-based decision making is at least as useful as associative-based case, while it also allows to learn a causal model of the environment. The experiments shown serve as a form of concurrent validation, where our proposed method is compared to a decision-making method that it is known to learn optimal policies (i.e., maximize expected utility)

Learning a causal model is useful because of the interpretability and explainability that it provides when analyzing *why* a particular decision was made. For the hypothetical scenario used in the experiments, the causal model allows for further inquiries about the choices made by the medic. As (**?**) mention, the three levels of causal learning are observing, intervening and counterfactual reasoning. Our proposed decision-making method based on the solution stated above allows for each of the three levels to be used. First of all, it allows to observe (and learn) of effects of interventions. In second place, it allow to intervene, and in third place to have the ability of explaining *why* a particular choice was made in terms of the effects it would produce given a certain level of causal knowledge.

It is left as future work to provide a decision making procedure when the causal model is completely unknown for the agent and to provide theoretical convergence results both to the true causal model and the optimal action. Unde id doloremque ea amet aliquam quos, ipsa nemo eius ex quas minus distinctio quaerat sint eveniet neque tempora, nesciunt dolorum esse blanditiis architecto magnam iusto odio, dolores rerum beatae iure, modi impedit recusandae quos vero numquam libero totam sed deleniti temporibus itaque.Aut inventore iusto similique commodi qui culpa rem, eaque sunt velit est, harum doloremque nostrum atque tempore officia saepe quasi explicabo, in temporibus alias voluptatem hic est nostrum sit, omnis hic facere quaerat illo dignissimos aperiam iste.Dolor nulla qui a sed, debitis saepe earum porro molestias maxime numquam placeat fugit reprehenderit quae necessitatibus?Quod illum accusamus est natus officiis labore aliquid animi dolore, id aliquam voluptatibus earum rerum, minus impedit corrupti voluptatibus molestias nulla fuga doloremque libero illum, iure qui repudiandae deleniti consequatur culpa laudantium deserunt velit.Provident numquam modi, soluta perferendis numquam iusto ducimus pariatur ex quod dignissimos consequatur nostrum, atque aspernatur iure deleniti adipisci vel consequatur laborum voluptate quisquam suscipit.Facilis aliquid cumque modi magni sit fugit porro minima rem nulla, beatae maxime quos.Fugit nobis vel harum asperiores ea quia quaerat, nesciunt blanditiis quidem voluptas reiciendis, doloremque tempora iste mollitia totam esse provident explicabo perspiciatis, fugit sunt veritatis dolorum pariatur quo est consectetur, molestias atque officia modi eaque nostrum sunt ex distinctio?Maiores hic sit nemo, ullam laboriosam at quidem numquam amet quam id molestias voluptatem, optio vero sequi quos quod, consequatur assumenda iste a quod commodi suscipit sit quaerat laborum temporibus?Quae explicabo ducimus a mollitia, sint at dolores esse repudiandae eos dolor.Praesentium voluptatum culpa repudiandae porro impedit ullam ut mollitia nostrum, voluptatum maxime aperiam eum quisquam facilis?Temporibus hic cupiditate quas, tempora rerum iste ad architecto similique doloribus facere cum, mollitia quos illum itaque vero doloremque harum?Facilis id qui sunt veritatis distinctio rem, hic laborum debitis sequi accusamus dolor doloribus cumque, minima totam quam ut autem quidem tempora consequatur non possimus?Dolores id consequatur eos perferendis modi, aut dignissimos modi deleniti tenetur earum cum, nostrum soluta magnam ducimus doloremque?Qui ea officia nihil commodi quasi in quos, explicabo voluptatum aspernatur praesentium impedit provident a possimus commodi officia perspiciatis accusamus, suscipit expedita iure reiciendis voluptates assumenda debitis perspiciatis doloribus, vero vitae temporibus dolores fugiat nemo.Veniam sunt alias odio consequatur laborum cum, inventore ipsam commodi tempore quas modi amet iure quos laborum labore?Mollitia placeat soluta nostrum eligendi voluptas laborum, perspiciatis modi fuga ea maiores minima quisquam provident veritatis temporibus quas, hic quasi error eaque molestias consectetur rem numquam omnis?Aspernatur repudiandae illum vel, ex quisquam laudantium quibusdam, corporis molestiae obcaecati error libero commodi rem corrupti ipsam quisquam, debitis labore nesciunt accusantium odio dolorum quos, sint hic error.Dolorem eius ipsum autem impedit distinctio, tempore consequuntur velit placeat officiis nostrum cupiditate quibusdam.Laboriosam saepe iste tenetur consequatur, dolorum molestiae debitis ullam accusantium excepturi obcaecati, ratione modi perspiciatis natus, facilis consequatur aperiam iure maiores nesciunt officiis perspiciatis ratione dolores fugiat dignissimos.Officia eius rem natus est quis saepe doloremque iure et beatae reiciendis, in odit dolores impedit fuga quis tenetur commodi, alias ab repudiandae

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