Curiosity Augmenting Graph Database of Epistemic Resources

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***Abstract*—**Psychological research on epistemic curiosity demonstrates that awareness of information gaps instigates curiosity. We cannot be curious about things we do not have a clue about and curiosity about a domain is positively correlated with the level of knowledge about that domain. If a piece of information is totally inaccessible to us, we do not have the chance to be aware of the information gap it constitutes and therefore cannot be curious about it. This paper offers a graph database model of epistemic resources that can be populated collectively and augment curiosity by making accessible otherwise inaccessible information gaps by logical operations.

***Keywords*—**Epistemic curiosity, curiosity augmenting, graph database, epistemic resource, logical operation, information gap

I. INTRODUCTION

Epistemic curiosity is an intrinsic human motivation to know. Recently there has been increased interest in the subject from the fields of philosophy and psychology. One of the discussions within the curiosity literature is about the capacity of formulating unknowns (linguistically or logically) that makes possible epistemic curiosity. Subasi argues that world knowledge (or world beliefs) and reasoning capacity (such as logical inferencing) are the main components of a proper description of this capacity [1]. When we direct our attention to something we do not know such as "the person who knocked the door", we rely on world knowledge through which our minds formulates an inostensible reference [3] of that unknown object. The logical description of such a reference would be (1) the door is knocked, (2) there must be something that causes the knocking and (3) this is likely to be a person. If the person knows that the door is loose and it is creating knocking-like noises when a wind blows or a cat rubs itself, such a world knowledge might change the formulation of the unknown as "the thing that causes the knocking sound coming from the door." Similarly, the possibility of our curiosities are related to the extent of our world knowledge. As a leading figure of psychological work on curiosity, Loewenstein argues that curiosity is instigated by a perceived gap between what one knows and what one wants to know. [4] What one wants to know is called informational reference point and it is a subjective perception. The informational reference point is sensitive to the extent of the world knowledge. For example, if a scholar is told that millions of academicians are watching a TED video about the philosophy of curiosity, this would be instrumental in increasing his curiosity about the subject. In this paper, we will offer a graph database model of logical expressions about certain pieces of world knowledge and demonstrate how this can augment curiosity.

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II. THE MODEL

In our model [2], each logical expression contains the information of an epistemic resource. An epistemic resource can be any content to be consumed by the curious person such as the formulation of an idea, the name of a book, the name of a scholar or a concept. Below is a small set of such epistemic resources written in the form of SUBJECT -> OBJECT [RELATION TYPE]. For the sake of simplicity we used two predicates, which are "related to" and "discussed by":

(E1) Meno's Paradox -> curiosity [related to]
(E2) Meno's Paradox -> Inan [discussed by]
(E3) Reference point -> Loewenstein[discussed by]
(E4) Reference point -> curiosity [related to]

Let us suppose that Researcher A is a philosopher and knows the expressions (E1) and (E2). He is interested in the subject of curiosity and he reads Inan because he knows that Meno's Paradox is related to curiosity and it is discussed by him. Let us further suppose that Researcher B is a psychologist and knows the expressions (E3) and (E4). He is similarly interested in the subject of curiosity and wants to learn more about the reference point concept of Loewenstein, because he knows that it is related to curiosity. In this example, Researcher A is not interested in reading Loewenstein, since he does not know him or his relation to the subject of curiosity. The lack of world knowledge about Loewenstein avoids the possibility of becoming aware of an information gap and therefore becoming curious about it.

Now let us assume that we populate a graph database with these expressions and run logical inferencing operations that retrieves 'related' epistemic resources. As discussed by Schmidt and Lahroodi [5] we tend to be curious about subjects which are related to our interest domains. Based on this idea, we formulate the Inference Rule-1 is as follows:

(1) If Resource A is related to Resource B and Researcher X is interested in Resource B, Researcher X is also likely to be interested in Resource A.

If Researcher A informs the graph database system about his interest in curiosity, then the system will retrieve Epistemic Resources (E1) and (E3). We can add another inference rule which links epistemic resources with scholars who discuss those resources:

(2) If Resource A is discussed by Resource B, and if Researcher A is interested in Resource A, then he is also likely to be interested in Resource B.

Based on Inference Rules 1 and 2, once the Researcher A informs the graph database about his interest in curiosity, Resources (E1) to (E4) will be available to him and this will augment his curiosity by making Loewenstein and his concept of informational reference point a hitherto unknown information gap to him.

As an collaborative process, Researcher A might realize that Meno's Paradox and the concept of reference point are related and formulate and populate into the system another expression like:

(E5) Meno's Paradox -> reference point [related to]

If this relation is an explanatory relation such that the concept of reference point can provide an explanation to Meno's Paradox, its curiosity instigating value would increase given relevant tagging of the resource such as:

(E6) Meno's Paradox -> reference point [explained by]

The change in the predicate needs to be reflected into the inference rule.

(3) If Resource A is explained by Resource B, and if Researcher A is interested in Resource A, then he is likely to be strongly interested in Resource B.

In such a scenario, Researcher A, who is a philosopher, can suddenly retrieve an expression describing a subject from the field of psychology that might solve a philosophical problem that he is very much interested into. The explanatory power of the resource is expected to instigate more curiosity based on the arguments of at least one of the curiosity theories.

III. CONCLUSION

Understanding the logical and psychological mechanisms of epistemic curiosity enables the design of collaborative graph databases that can augment human epistemic curiosity. Our simple model offered in this paper exploits simple logical expressions of specific world knowledge and logical inferencing operations for retrieving epistemic resources that act as information gaps hitherto unknown to the user. These information gaps nourish the user's epistemic curiosity and therefore might be expected to effect the learning process positively. The idea of combining the insights of curiosity research with computational design is new and offers a promising research agenda.

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