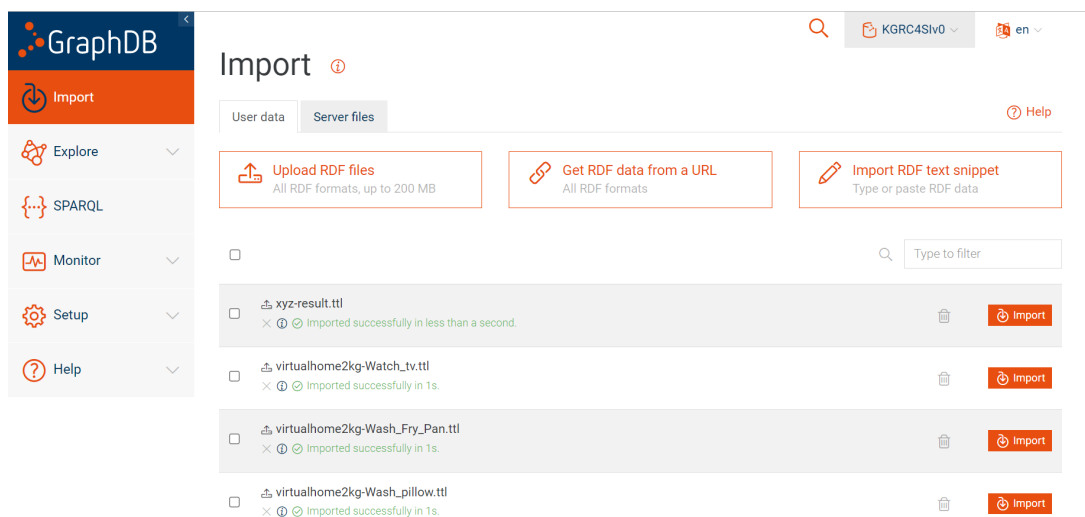SPARQL クエリの使用手順

① Graph DB のインストール(ローカル環境で実行します)

リポジトリは「**KGRC4SIv01**」を選択してください。（2022/12/28 時点）

② 左の Import タブからテストデータセットのインポート

Upload RDF files ボタンでデータセットのアップロード後、右のオレンジの Import ボタンを押して緑のチェックマークがついたことを確認してください

③ 位置情報を取得するクエリの実行

左の SPRAQL タブから以下のクエリを書いて実行してください

```
PREFIX x3do: <https://www.web3d.org/specifications/X3dOntology4.0#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX : <http://example.org/virtualhome2kg/ontology/>
PREFIX ex: <http://example.org/virtualhome2kg/instance/>
CONSTRUCT {
    ?object :xzahyo ?xzahyo_node .
    ?object :yzahyo ?yzahyo_node .
    ?object :zzahyo ?zzahyo_node .
    ?xzahyo_node rdf:value ?size_x ;
          :unit :meter .
    ?yzahyo_node rdf:value ?size_y ;
          :unit :meter .
    ?zzahyo_node rdf:value ?size_z ;
          :unit :meter .

} WHERE {
```

```
        ?state1 :isStateOf ?object ; :bbox ?shape1 .
        ?shape1 x3do:bboxSize ?size1 .
        ?size1    rdf:first ?size_x .
    ?size1    rdf:rest    ?size2 .
    ?size2    rdf:first ?size_y .
    ?size2    rdf:rest    ?size3 .
    ?size3    rdf:first ?size_z .
    BIND(REPLACE(STR(?object), STR(ex:) ,"") AS ?object_name)
    BIND(URI(CONCAT(STR(ex:),"xzahyo_",                   ?object_name))
AS ?xzahyo_node)
    BIND(URI(CONCAT(STR(ex:),"yzahyo_",                   ?object_name))
AS ?yzahyo_node)
    BIND(URI(CONCAT(STR(ex:),"zzahyo_",                   ?object_name))
AS ?zzahyo_node)
}
```

```
 1  PREFIX x3do: <https://www.web3d.org/specifications/X3dOntology4.0#>
 2  PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
 3  PREFIX : <http://example.org/virtualhome2kg/ontology/>
 4  PREFIX ex: <http://example.org/virtualhome2kg/instance/>
 5  CONSTRUCT {
 6      ?object :xzahyo ?xzahyo_node .
 7      ?object :yzahyo ?yzahyo_node .
 8      ?object :zzahyo ?zzahyo_node .
 9      ?xzahyo_node rdf:value ?size_x ;
10          :unit :meter .
11      ?yzahyo_node rdf:value ?size_y ;
12          :unit :meter .
13      ?zzahyo_node rdf:value ?size_z ;
14          :unit :meter .
15
16  } WHERE {
17      ?state1 :isStateOf ?object ; :bbox ?shape1 .
18      ?shape1 x3do:bboxSize ?size1 .
19      ?size1  rdf:first ?size_x .
20      ?size1  rdf:rest  ?size2 .
21      ?size2  rdf:first ?size_y .
22      ?size2  rdf:rest  ?size3 .
23      ?size3  rdf:first ?size_z .
24      BIND(REPLACE(STR(?object), STR(ex:) ,"") AS ?object_name)
25      BIND(URI(CONCAT(STR(ex:),"xzahyo_", ?object_name)) AS ?xzahyo_node)
26      BIND(URI(CONCAT(STR(ex:),"yzahyo_", ?object_name)) AS ?yzahyo_node)
27      BIND(URI(CONCAT(STR(ex:),"zzahyo_", ?object_name)) AS ?zzahyo_node)
28  }
29
```

実行後、Download as ボタンから Turtle 形式などで結果をダウンロードし、③の手順と
同様にインポートしてください(このインポートが完了しないと次のクエリが実行でき

④ 各クエリの実行

・高い場所に手を伸ばす動作を検出するための SPARQL クエリ

```
PREFIX hra: <http://example.org/virtualhome2kg/ontology/homeriskactivity/>
PREFIX x3do:<https://www.web3d.org/specifications/X3dOntology4.0#>
PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX : <http://example.org/virtualhome2kg/ontology/>
PREFIX ho: <http://www.owl-ontologies.com/VirtualHome.owl#>
PREFIX                                                              ob:
<http://raw/githubusercontent.com/aistairc/HomeObjectOntology/main/HomeObject.owl#>
PREFIX ac: <http://example.org/virtualhome2kg/ontology/action/>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
CONSTRUCT{
    ?a hra:riskFactor ?e.
    ?e a hra:DoSomethingToHighPositionObject.
}WHERE{
    ?a :hasEvent ?e.
    ?e :agent ?person; :situationAfterEvent ?situation; ho:object ?o; :action ?action.
    ?o :yzahyo/rdf:value ?oy.
    ?person :yzahyo/rdf:value ?py.
    ?state1 :isStateOf ?person; :partOf ?situation; :bbox ?shape1.
    ?state2 :isStateOf ?o;:partOf ?situation; :bbox ?shape2.
    ?shape1 x3do:bboxCenter ?center1; x3do:bboxSize ?size1.
    ?center1 rdf:rest/rdf:first ?center_y1.
    ?shape2 x3do:bboxCenter ?center2; x3do:bboxSize ?size2.
    ?center2 rdf:rest/rdf:first ?center_y2.
    FILTER(( ?center_y2+(?oy*0.5))>=(?center_y1+(?py*0.5)))
    FILTER(?action!=ac:walk&&?action!=ac:watch   &&   ?action!=ac:turnTo
&& ?action!=ac:lookAt)
    MINUS{?o rdf:type/rdfs:subClassOf*ob:Room}
}
```

```
 1  PREFIX hra: <http://example.org/virtualhome2kg/ontology/homeriskactivity/>
 2  PREFIX x3do:<https://www.web3d.org/specifications/X3dOntology4.0#>
 3  PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
 4  PREFIX : <http://example.org/virtualhome2kg/ontology/>
 5  PREFIX ho: <http://www.owl-ontologies.com/VirtualHome.owl#>
 6  PREFIX ob: <http://raw/githubusercontent.com/aistairc/HomeObjectOntology/main/HomeObject.owl#>
 7  PREFIX ac: <http://example.org/virtualhome2kg/ontology/action/>
 8  PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
 9  CONSTRUCT{
10      ?a hra:riskFactor ?e.
11      ?e a hra:DoSomethingToHighPositionObject.
12  }WHERE{
13      ?a :hasEvent ?e.
14      ?e :agent ?person; :situationAfterEvent ?situation; ho:object ?o; :action ?action.
15      ?o :yzahyo/rdf:value ?oy.
16      ?person :yzahyo/rdf:value ?py.
17      ?state1 :isStateOf ?person; :partOf ?situation; :bbox ?shape1.
18      ?state2 :isStateOf ?o;:partOf ?situation; :bbox ?shape2.
19      ?shape1 x3do:bboxCenter ?center1; x3do:bboxSize ?size1.
20      ?center1 rdf:rest/rdf:first ?center_y1.
21      ?shape2 x3do:bboxCenter ?center2; x3do:bboxSize ?size2.
22      ?center2 rdf:rest/rdf:first ?center_y2.
23      FILTER(( ?center_y2+(?oy*0.5))>=(?center_y1+(?py*0.5)))
24      FILTER(?action!=ac:walk&&?action!=ac:watch && ?action!=ac:turnTo && ?action!=ac:lookAt)
25      MINUS{?o rdf:type/rdfs:subClassOf*ob:Room}
26  }
27
```

・低い棚から物を取り出す動作を検出するための SPARQL クエリ

```
PREFIX hra: <http://example.org/virtualhome2kg/ontology/homeriskactivity/>
PREFIX x3do:<https://www.web3d.org/specifications/X3dOntology4.0#>
PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX : <http://example.org/virtualhome2kg/ontology/>
PREFIX ho: <http://www.owl-ontologies.com/VirtualHome.owl#>
PREFIX ob: <http://raw/githubusercontent.com/aistairc/HomeObjectOntology/main/HomeObject.owl#>
PREFIX ac: <http://example.org/virtualhome2kg/ontology/action/>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
CONSTRUCT{
    ?a hra:riskFactor ?e.
    ?e a hra:GrabLowPositionObject.
}WHERE{
    ?a :hasEvent ?e.
    ?e :agent ?person; :situationAfterEvent ?situation; ho:object ?o; :action ?action.
    ?o :yzahyo/rdf:value ?oy.
    ?person :yzahyo/rdf:value ?py.
```

```
?state1 :isStateOf ?person; :partOf ?situation; :bbox ?shape1.
?state2 :isStateOf ?o;:partOf ?situation; :bbox ?shape2.
?shape1 x3do:bboxCenter ?center1; x3do:bboxSize ?size1.
?center1 rdf:rest/rdf:first ?center_y1.
?shape2 x3do:bboxCenter ?center2; x3do:bboxSize ?size2.
?center2 rdf:rest/rdf:first ?center_y2.
FILTER(( ?center_y2+(?oy*0.5))<=(?center_y1)+(?py*0.5))
FILTER(?action=ac:grab)
}
```

```
1   PREFIX hra: <http://example.org/virtualhome2kg/ontology/homeriskactivity/>
2   PREFIX x3do:<https://www.web3d.org/specifications/X3dOntology4.0#>
3   PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
4   PREFIX : <http://example.org/virtualhome2kg/ontology/>
5   PREFIX ho: <http://www.owl-ontologies.com/VirtualHome.owl#>
6   PREFIX ob: <http://raw/githubusercontent.com/aistairc/HomeObjectOntology/main/HomeObject.owl#>
7   PREFIX ac: <http://example.org/virtualhome2kg/ontology/action/>
8   PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
9   CONSTRUCT{
10      ?a hra:riskFactor ?e.
11      ?e a hra:GrabLowPositionObject.
12  }WHERE{
13      ?a :hasEvent ?e.
14      ?e :agent ?person; :situationAfterEvent ?situation; ho:object ?o; :action ?action.
15      ?o :yzahyo/rdf:value ?oy.
16      ?person :yzahyo/rdf:value ?py.
17      ?state1 :isStateOf ?person; :partOf ?situation; :bbox ?shape1.
18      ?state2 :isStateOf ?o;:partOf ?situation; :bbox ?shape2.
19      ?shape1 x3do:bboxCenter ?center1; x3do:bboxSize ?size1.
20      ?center1 rdf:rest/rdf:first ?center_y1.
21      ?shape2 x3do:bboxCenter ?center2; x3do:bboxSize ?size2.
22      ?center2 rdf:rest/rdf:first ?center_y2.
23      FILTER(( ?center_y2+(?oy*0.5))<=(?center_y1)+(?py*0.5))
24      FILTER(?action=ac:grab)
25  }
26
```

・物の近くを歩く動作を検出するための SPARQL クエリ
（こちらのクエリではとくに実行に時間がかかるため末尾に
limit 5 等をつけることを推奨します）

PREFIX hra: <http://example.org/virtualhome2kg/ontology/homeriskactivity/>
PREFIX x3do:<https://www.web3d.org/specifications/X3dOntology4.0#>
PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX : <http://example.org/virtualhome2kg/ontology/>
PREFIX ho: <http://www.owl-ontologies.com/VirtualHome.owl#>
PREFIX   ob:
<http://raw/githubusercontent.com/aistairc/HomeObjectOntology/main/HomeObject.owl#>

```
PREFIX ac: <http://example.org/virtualhome2kg/ontology/action/>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
CONSTRUCT{
        ?a hra:riskFactor ?e.
        ?e a hra:WalkClose.
}WHERE{
        ?a :hasEvent ?e.
        ?e :agent ?person; :situationAfterEvent ?situation; ho:object ?o; :action ?action.
        ?o :xzahyo/rdf:value ?ox.
        ?person :xzahyo/rdf:value ?px.
        ?o :zzahyo/rdf:value ?oz.
        ?person :zzahyo/rdf:value ?pz.
        ?state1 :isStateOf ?person; :partOf ?situation; :bbox ?shape1.
        ?state2 :isStateOf ?o;:partOf ?situation; :bbox ?shape2.
        ?shape1 x3do:bboxCenter ?center1; x3do:bboxSize ?size1.
        ?center1 rdf:first ?center_x1.
        ?center1 rdf:rest/rdf:rest/rdf:first ?center_z1.
        ?shape2 x3do:bboxCenter ?center2; x3do:bboxSize ?size2.
        ?center2 rdf:first ?center_x2.
        ?center2 rdf:rest/rdf:rest/rdf:first ?center_z2.
        FILTER((?center_x2-?center_x1)<=((?px/2)+(?ox/2)))
        FILTER((?center_z2-?center_z1)<=((?pz/2)+(?oz/2)))
        FILTER(?action=ac:walk)
}
```

```
 1  PREFIX hra: <http://example.org/virtualhome2kg/ontology/homeriskactivity/>
 2  PREFIX x3do:<https://www.web3d.org/specifications/X3dOntology4.0#>
 3  PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
 4  PREFIX : <http://example.org/virtualhome2kg/ontology/>
 5  PREFIX ho: <http://www.owl-ontologies.com/VirtualHome.owl#>
 6  PREFIX ob: <http://raw.githubusercontent.com/aistairc/HomeObjectOntology/main/HomeObject.owl#>
 7  PREFIX ac: <http://example.org/virtualhome2kg/ontology/action/>
 8  PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
 9  CONSTRUCT{
10      ?a hra:riskFactor ?e.
11      ?e a hra:WalkClose.
12  }WHERE{
13      ?a :hasEvent ?e.
14      ?e :agent ?person; :situationAfterEvent ?situation; ho:object ?o; :action ?action.
15      ?o :xzahyo/rdf:value ?ox.
16      ?person :xzahyo/rdf:value ?px.
17      ?o :zzahyo/rdf:value ?oz.
```

Run

keyboard shortcut

```
18      ?person :zzahyo/rdf:value ?pz.
19      ?state1 :isStateOf ?person; :partOf ?situation; :bbox ?shape1.
20      ?state2 :isStateOf ?o;:partOf ?situation; :bbox ?shape2.
21      ?shape1 x3do:bboxCenter ?center1; x3do:bboxSize ?size1.
22      ?center1 rdf:first ?center_x1.
23      ?center1 rdf:rest/rdf:rest/rdf:first ?center_z1.
24      ?shape2 x3do:bboxCenter ?center2; x3do:bboxSize ?size2.
25      ?center2 rdf:first ?center_x2.
26      ?center2 rdf:rest/rdf:rest/rdf:first ?center_z2.
27      FILTER((?center_x2-?center_x1)<=((?px/2)+(?ox/2)))
28      FILTER((?center_z2-?center_z1)<=((?pz/2)+(?oz/2)))
29      FILTER(?action=ac:walk)
30  }
```

⑤ Dgl-ke のプログラムの利用

④で作成したクエリの結果を turtle ファイルでダウンロードして使用してください

（詳しくは Dgl-ke のプログラムや使用方法を参照してください）

⑥ GPT3 のプログラムの利用（**以下、直接利用する場合**）

④で作成したクエリの CONSTRUCT~WHERE の部分を SELECT WHERE に変更して
実行すると結果を CSV 形式でダウンロードできます

GPT3 のプログラムではこの CSV 形式のファイルで使用してください

（詳しくは GPT3 のプログラムや使用方法を参照してください）

以下、高い場所に手を伸ばす動作を検出するための SPARQL クエリを
SELECT WHERE 文に変更した例です

PREFIX hra: <http://example.org/virtualhome2kg/ontology/homeriskactivity/>

PREFIX x3do:<https://www.web3d.org/specifications/X3dOntology4.0#>

PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>

PREFIX : <http://example.org/virtualhome2kg/ontology/>

PREFIX ho: <http://www.owl-ontologies.com/VirtualHome.owl#>

PREFIX   ob:
<http://raw/githubusercontent.com/aistairc/HomeObjectOntology/main/HomeObject.owl#>

PREFIX ac: <http://example.org/virtualhome2kg/ontology/action/>

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

SELECT WHERE{

    ?a :hasEvent ?e.

    ?e :agent ?person; :situationAfterEvent ?situation; ho:object ?o; :action ?action.

    ?o :yzahyo/rdf:value ?oy.

    ?person :yzahyo/rdf:value ?py.

    ?state1 :isStateOf ?person; :partOf ?situation; :bbox ?shape1.

    ?state2 :isStateOf ?o;:partOf ?situation; :bbox ?shape2.

    ?shape1 x3do:bboxCenter ?center1; x3do:bboxSize ?size1.

?center1 rdf:rest/rdf:first ?center_y1.
?shape2 x3do:bboxCenter ?center2; x3do:bboxSize ?size2.
?center2 rdf:rest/rdf:first ?center_y2.
FILTER((?center_y2+(?oy*0.5))>=(?center_y1+(?py*0.5)))
FILTER(?action!=ac:walk&&?action!=ac:watch   &&   ?action!=ac:turnTo
&& ?action!=ac:lookAt)
MINUS{?o rdf:type/rdfs:subClassOf*ob:Room}
}