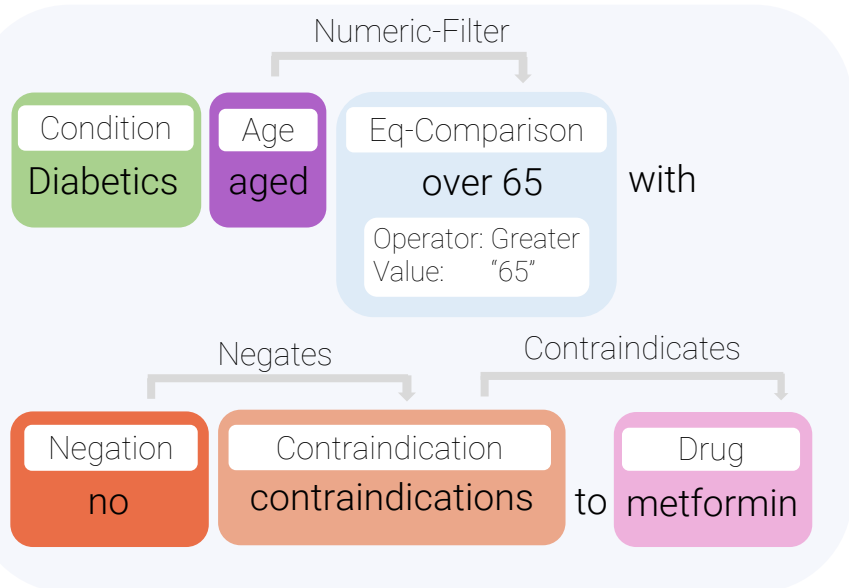


Raw input

"Diabetics aged over 65 with no contraindications to metformin"

Predict named entities and relations



Transform to logical form input string

"cond("Diabetics") age() eq(op(GT), val("65")) with
neg() contraindication() to drug("metformin")"

Predict logical form structure

```
intersect(  
  cond("Diabetics"),  
  age()  
    .num_filter(eq(op(GT), val("65"))),  
  neg(  
    contraindication(  
      drug("metformin")  
    )  
  )  
)
```

Map to database
Semantic
Metadata
Annotation and
generate SQL
queries

INTERSECT

```
SELECT... FROM condition WHERE dx_code...  
SELECT... FROM person WHERE age > 65  
SELECT... FROM person WHERE NOT EXISTS  
  (SELECT... FROM condition WHERE dx_code...  
   SELECT... FROM medication WHERE med_code...)
```

Use Knowledge
Base to Reason
unspecified
criteria

```
intersect(  
  cond(CUI: C0241863),  
  age()  
    .num_filter(eq(op(GT), val(65))),  
  neg(  
    cond(CUI: C0035078), "Renal Insufficiency"  
    drug(CUI: C3253985) "Dolutegravir" ...  
  )  
)
```

Normalize to
UMLS concepts

```
intersect(  
  cond(CUI: C0241863),  
  age()  
    .num_filter(eq(op(GT), val(65))),  
  neg(  
    contraindication(  
      drug(CUI: C0025598).  
    )  
  )  
)
```