Theory and Application of Ontologies (CS6852)

SONGS ONTOLOGY REPORT

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Introduction:

Our Ontology models the domain of “Song”. It captures information about songs, artists, albums etc. using description logic.

It stores information/knowledge about songs like name of the album it belongs to, name of the band that sang it, genre of the song, language of the song, studio in which song was recorded, if the song was composed by single person, then the name of the singer and more.

Classes and Properties:

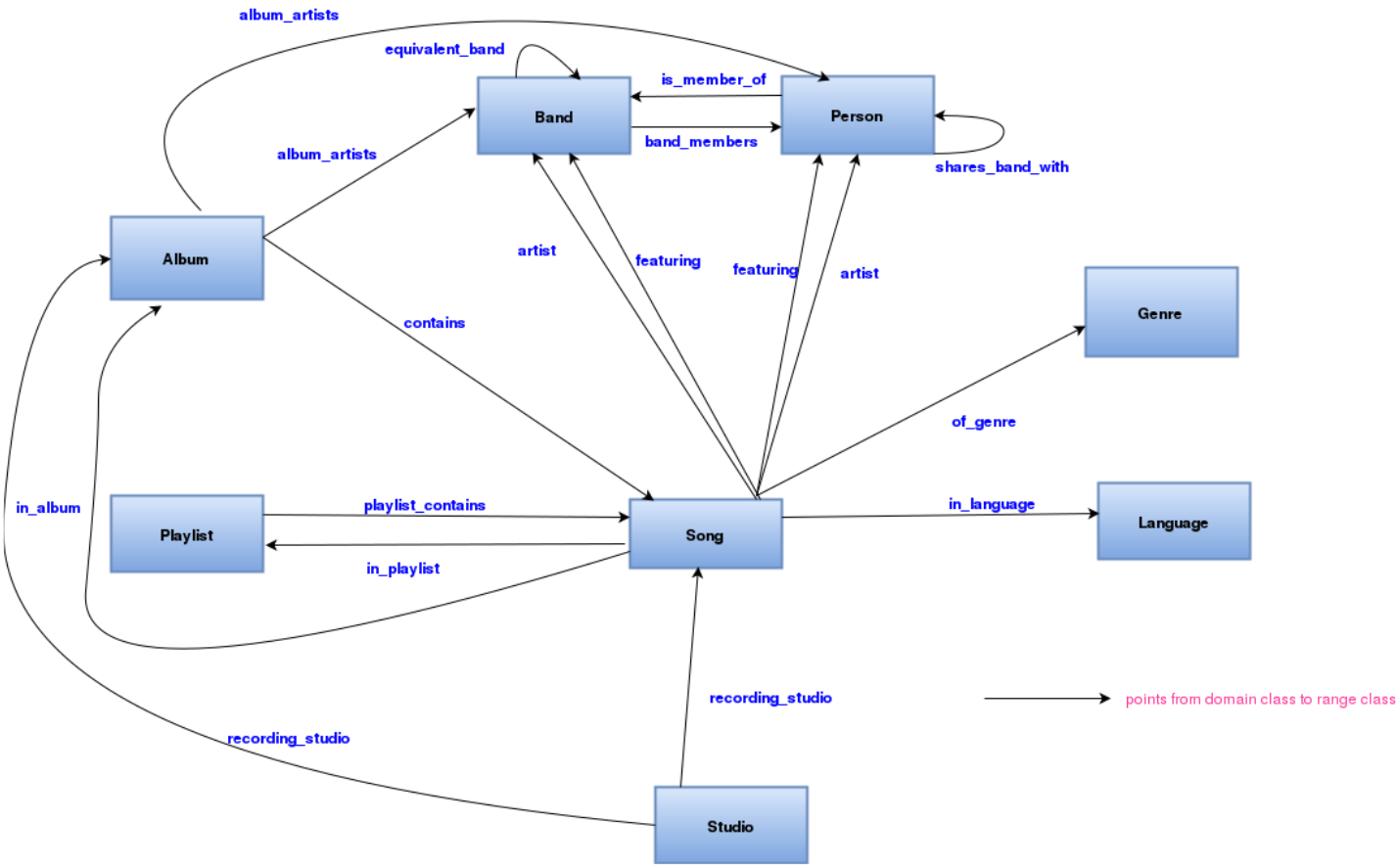
1. Class Hierarchy:
    a. Album
    b. Band
    c. Genre
    d. Language
    e. Person
        i. Instrumentalist
            1. Accordionist
            2. Bandurist
            3. Bassist
            4. Bassoonist
            5. Bouzouki_play
            6. Cellist
            7. Clarinetist
            8. Drummer
            9. Euphoniumist
            10. Flautist
            11. Guitarist
            12. Harpist
            13. Hornist
            14. Keyboardist
            15. Organ_grinder
            16. Organist
            17. Percussionist
            18. Pianoist
            19. Saxophonist
            20. Trumpeter
            21. Violinist
            22. violist

    ii. Lyricist
    iii. Music_Director
    iv. Rapper
    v. Vocalist
f. Playlist
g. Song
h. Studio

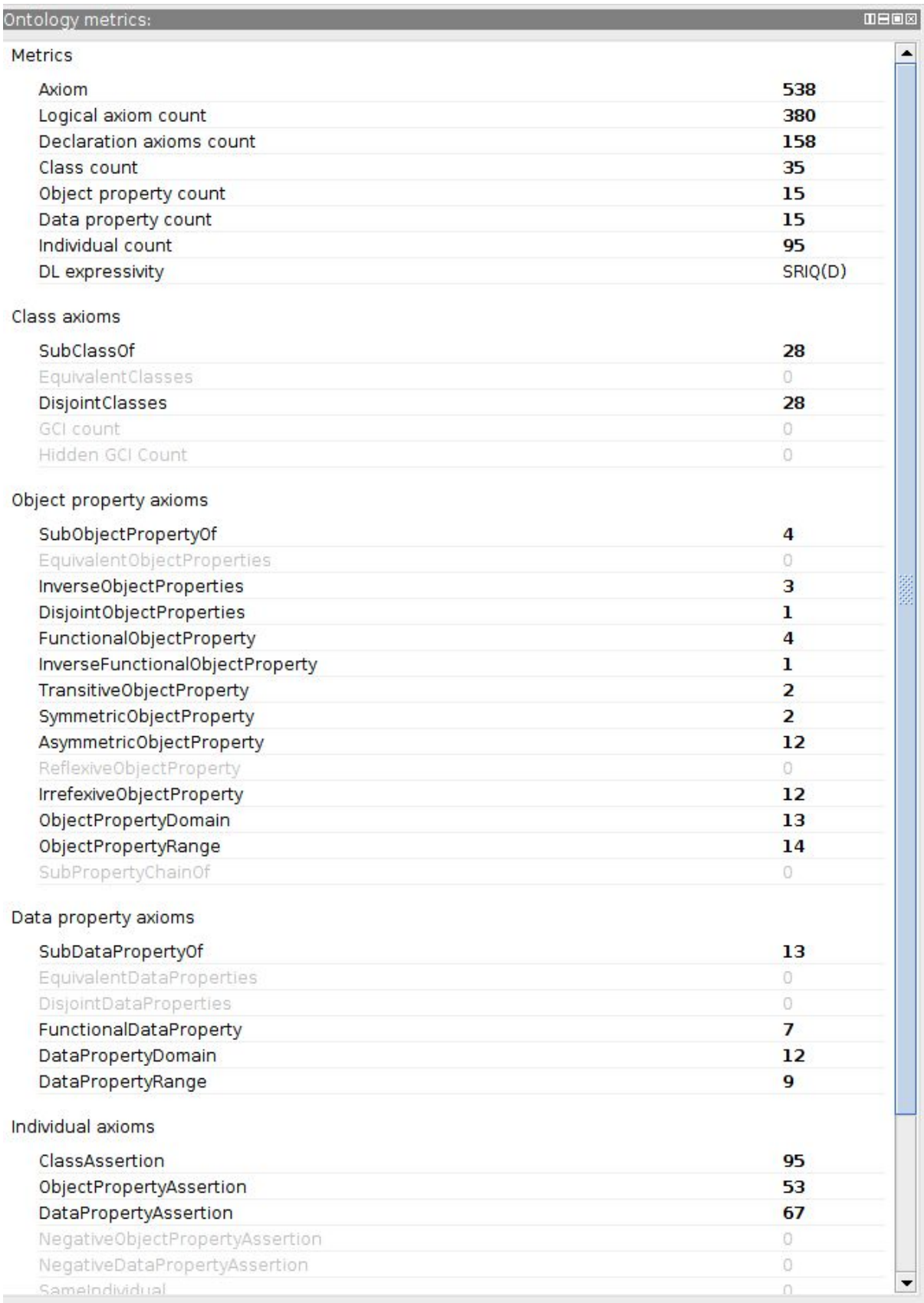
2. Object Properties:
    a. album_artists
    b. artist
    c. brand_members
    d. contains
    e. featuring
    f. in_album
    g. in_language
    h. in_playlist
    i. is_member_of
    j. of_genre
    k. playlist_contains
    l. recording_studio
    m. shares_band_with
    n. equivalent_band

3. Datatype Properties:
    a. award
    b. bitrate
    c. file_format
    d. gender
    e. is_instrumental
    f. no_of_songs
    g. origin
    h. song_length
    i. year

Object Properties Relationships:



Ontology metrics:

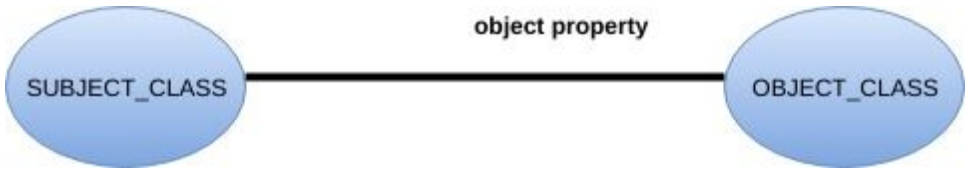


Ontology Expressivity:

1. Our ontology has expressivity SRIQ(D).
2. S stands for ALC + Transitive properties. We use transitive properties for shares_band_with and equivalent_band.
3. R stands for reflexivity and irreflexivity. We use irreflexivity for various properties like album_artists, album etc.
4. I stands for inverse properties. We use inverse properties for band_member (inverse of is_member_of), contains (inverse of in_album) etc.
5. Q stands for Qualified cardinality restrictions. We use playlist_contains property and have restriction on playlist that each playlist is related to at least one song by the playlist_contains property.
6. (D) stands for use of datatype properties, data values or data types. We have used variety of datatype properties like bitrate, file_format etc.

Modelling Rationale:

1. We wanted to capture most of the information related to songs and entities somehow related to songs. We thought it is logical to make entities as classes and binary relations as object properties and data properties, i.e., the subject and object in triples are classes and properties are the predicates.



2. We have made all the human entities as one class. Since human entities who are related to song are of different kinds like singer, playback, singer, music director etc., so we have divided whole person class into subclasses of Instrumentalist, Lyricist, Music_Director, Rapper and Vocalist. Note however that none of them are disjoint since the same individual could perform multiple kinds of jobs.
3. Again Instrumentalist can be divided into subclasses of individual music instruments.
4. The main entities surrounding songs were Artists, Albums, Playlists, Genre, Language and Studio each of which we modelled as classes and added individuals of their types.
5. These entities were connected using object properties like artist, album_artist, contains, featuring, in_album etc.

6. We used data properties to model metadata about song files that we had. These include bitrate, file_format, song_length, year.
7. We also use data properties to store awards won by songs/albums/artists.
8. We also use data properties to identify is an instrumental or not. We could have made Instrumental as a class but we chose to do it this way because we were running short of datatype properties.

Possible queries:

1. Query to display songs in queried albums.
2. Query to find artist of the song and whether it was a band or an individual.
3. Query to find name of the band which composed that song, and information about that song.
4. Query to find whether the both bands are same or not, i.e., whether one of the bands was the former version of the other.
5. Query to check membership of person in a band.
6. Query to find genre of the song and find similar songs based on the genre.
7. Query to find playlists containing queried songs.
8. Query to find songs that have won certain awards.
9. Query to list all the past albums or songs recorded at queried studio.
10. Query to list all the songs in queried album.
11. Query to check whether the song belongs to queried playlist or not.

Limitations & Future Extensions:

1. Currently, the ontology doesn't support user ratings. We could possibly extend it by adding weighted edges between songs that model user ratings. The weights could be modified as per user feedback and this edge could be used for recommending songs.
2. We are using song/artist/album names directly in the IRIs. Ideally, we should use some other identifier for the IRIs and have an edge for name/title. This would allow entering songs/albums/artists etc. having the same name. We forgoed this in the interest of saving time.
3. We could model remix and inspiration songs in future versions and have transitive relations connecting originals/inspirations.

Applications:

1. It could be used in music copyrights issuing offices. It allows people to query records of the songs quickly before issuing copyright for new songs.
2. Could be extended for use in songs recommendation engines.