Table 1: Existing Clothing Ontologies

Ontology/Model and Language	Main Entities	Relations
SERVIVE [13], OWL	Body type, colors, companies, garments (features, material), human colour categories, seasonal human style color, occasion, style	Co-occurs, hasInterest, hasHigh/Low/NeutralRecommendation. hasBodyType/Fit/EyeColour, hasGarmentBut-tons/Colour/Feature/Material/ HumanStyleColour, hasOcassion, has-Sleeves/Stripes/Style/styleDescription, isForOccasion, manufacturedBy, similarTo, isColour
Fashion ontology [9], RDF	Celebrity, designer, model, clothing term, trend, season	
Indian garment ontology [1], MOWL	Craft (stitch, print, embroidery), material, textile categories,	Celebrity validation
Fashion cognitive model [7]	Garment parts (silhouette, waist, length, collar, sleeve, ornaments, symmetry)	
Fashion cognitive model [16]	Body shape, desired emotional theme	Effectiveness, acceptability, realizability

main, open data portals such as Dbpedia and Freebase [2] contain 1K topics and 3K facts around fashion, clothing and textiles[3]. Despite the richness and structure found in these formal base resources, the creative and subjective, contextual part of fashion is missing from these knowledge bases.

2.2 Cognitive Models for Fashion Modelling

In the literature there are non-ontological models which frame similar problems. They blend human and machine models for evaluating specific body shapes' relevance to a desired emotional fashion theme or intention to be transmitted. For instance, in [16], *effectiveness* evaluates whether recommended styles are relevant to the design objective or desired fashion theme, *acceptability* refers to whether the best recommended style is accepted by the expert, and *realizability* assesses if the proposed recommender system can be applied to the fashion [16].

An example of a cognitive model for fashion style decision making is in [7], where Genetic Algorithms enhanced with Multi-alternative Decision Field Theory (MDFT) tackle the context and choice set problem in decision making by using *psychological distance* between alternatives. The latter is based on the Euclidean distance among positions in a multi-attribute-dimensional subjective evaluation space.

2.3 Subjectivity in other domains

We identify a lack of a *subjective style* schema in the related work that goes beyond the biology or mechanics of clothing, and that expresses a more wholistic personal approach than the existing *inventory* clothing ontologies. By *inventory ontologies*, we mean those based on static attribute-based or physical feature spaces.

Other subjective and hard to describe domains such as music also benefit from having taxonomical classifications in form of ontologies. For instance, projects such as MusicBrainz [4] collects music metadata, and the Music Ontology[5][10] is a formal framework to deal with music-related information on the Semantic Web including editorial, cultural and acoustic information. Just like in music, a fashion ontology can integrate fashion-related data across multiple sources, or enrich search-engine results around decades, styles or influencers. Because of this, musicians might be useful allies for the fashion industry, (e.g., *thanks to their status as bohemian individuals*) and music industry might need fashion [8], e.g., to model music taste or predict fashion cliques.

Another similar natural phenomenon is language, where influence networks, among many other factors in time, model organically the evolution of its spread, its vocabulary, grammar rules, tonality, etc. In all, music, fashion and languages, influence and subjectivity are inherent to the domain and for them to fully be considered into machine learning systems, they need to be modelled quantitatively.

2.4 Fashion Ontology Use Cases

In fashion, the human component of algorithm evaluation is necessary [12, 14]. Guided by this, we identify candidate applications where a fashion ontology enhanced with a better subjective data representation would likely be helpful.

1. Defining stylistic rule guides and recommendations or predicting specific trends. For instance, to answer questions on: how to be edgy and ahead of the fashion trend without being too far off, or how to predict the Oscars' ceremony outfits?[6].

2. Predicting mass production trends. For example, the problems of cost-efficient budget and resource allocation as well as market demand optimization.

[3] `https://developers.google.com/freebase/`

[4] The Open Music Encyclopedia `https://musicbrainz.org/`

[5] `http://www.musicontology.com`

[6] `http://www.usatoday.com/story/life/entertainthis/2016/02/23/oscar-fashion-predicting-what-stars-wear-red-carpet/80747356/`