Dipartimento di Ingegneria e Scienza dell'Informazione

– KnowDive Group –

Tourist Events

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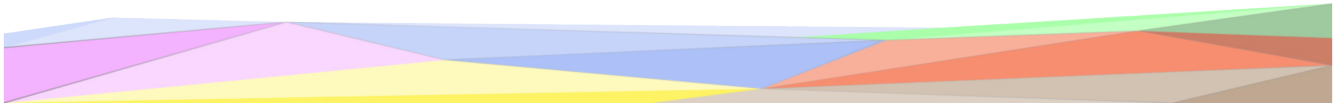

Contents

Revision History:

Revision	Date	Author	Description of Changes

1 Knowledge Graph Codebook

The first of the two sections, in the current document, contains the codebook of the whole KG (Knowledge Graph), including the description of all the data and information that it contains.

1.1 Knowledge Graph general description

This sub section aims to give a general description of the KG, reporting:

- the context/domain in which the KG lives and works;
- *The Problem* the KG aims to solve;
- How the KG can solve *The Problem*

1.2 Data level

The data level section aims to describe in details the (final version of) datasets collected and managed by the KG, with a description of each variable involved.

1.2.1 Datasets general details

In this section are reported the metadata at datasets level, so the metadata regarding the sources, the authors, the collection methods, and so on.

1.2.2 Datasets metadata documentation

In this section are reported the metadata at dataset attribute level, through a description of each variable involved in the datasets collected, specifying the variable types, meanings, value-set (possible values), and every other meaningful variable information.

1.3 Ontology level

The ontology level section aims to describe the underlying KG ontology, through the description of its elements at each level, reporting so the language, conceptual and schema resources used within it.

1.3.1 Ontology general details

This first sub section of the ontology level description, report the general details such as authors, sources and the description of external ontology eventually adopted to generate the final one.

1.3.2 Ontology metadata documentation

In this section instead, are reported the more specific metadata describing the single elements of the ontology (terms, concepts, ETypes and relations).

1.4 Knowledge Graph Evaluation

In the final section of this first chapter, the KG Evaluation is reported. It aims to describe, through specific metrics, the quality of the overall KG on different aspect, like domain coverage, usability, domain representation, and other meaningful aspects.

2 Knowledge Graph Development Process

The second chapter of this document aims to describe, in a detailed way, the KG development process. The sections below describe each phase of the KG building project, reporting for each phase, the description of the datasets and their evolution respect the previous phases, the schema construction which will generate the KG ontology in the end, as well as the description of the procedures adopted to manage the data and finally achieve those results. Moreover for each phase is reported an evaluation section, which aims to evaluate the quality of the results achieved at the end of each phase.

2.1 Scope Definition

2.1.1 Purpose

Aside from experiencing beautiful sights of nature, a tourist is supposed to be amused and entertained by local festivals, concerts, visiting historical areas, monuments, restaurants and any other engaging events organized inside the territory he or she is travelling. To pick up the best set of events for a tourist to participate can be achieved by inspecting the adequate reviews from the previous tourists for each event. Nonetheless, this gives rise to two significant challenges. First, the tourist, for a given period, has to stack up the activities corresponding to his or her interest, as a result of choosing the most compatible ones from each of the event categories, such as points of interest to visit, films to watch, restaurants to dine at, community meetings, and other events. Second, assuming the combination the tourist favors the most is found, optimal arrangement of those events in the best possible chronological order is needed. For instance, one cannot be expected to leave for another event while the current activity is still ongoing or the location of the next one is too far. With a simple observation, it is effortless to tell a pair of combinatorial and permutation tasks by a machine could solve these manual optimizations as long as there is a coherently schematized knowledge graph associated to a different set of datasets concerning diverse event contexts. Therefore, this project is aimed at coming up with a solution to the data heterogeneity problem described above by means of designing a knowledge graph which will integrate data about various tourism events, basing on the locality, time, individual behaviour patterns and interaction preferences in order for the tourist to easily enlist a perfect sequence of events.

2.1.2 Scope of work

Considering the amount of data we have found, size of the end application, time we are assigned, we have decided to integrate datasets, on the scope of only the city of Trento, composed of points of interests, restaurants, shops, hotels, monuments to visit, their ratings and reviews from TripAdvisor, movies from cinemas, special public events, festivals, concerts and sport activities.

2.1.3 Scenarios of usages

Tourist events are one of the exciting experiences everyone would love to explore during their lifetime. Getting to feed your eyes with what you may have never seen or what your eyes love to see most, one can receive a sense of refreshment and containment at a personal level depending on an individual idiosyncrasies. However, this experience can be more memorable if the answers of what, when, why and how to attain them are fully tackled. Let us discover more with the help of the following personas we present:

- **Sofia:** An international student to study at University of Trento through the Erasmus+ program, is fond of two activities: patronizing flea markets to collect merchandises, which would later become reminiscent of the particular local areas she had visited to and being entertained by different theatrical performances depending on the mood she is in. For the five months period, the catalogues of merchandises up for sale, whose arrangements are organized on a certain day in a specific commune in Trentino, and the typologies of theatrical events with the associated descriptions would facilitate her scheduling while keeping her academic development intact. In addition, her lack of familiarity with the language and the country's historical contexts would deter her comprehensive understanding of some performances, a few categories such as ballet, opera or circus events which don't require prior information and are mostly universally interpreted activities could be optimal. Lastly, while attending events wherein varieties of local hand-made products not to be found on websites like amazon are available for sale, she is also captivated by cuisine exhibitions being organized close to the area where she is.

- **Tojo:** a Japanese novelist, a tourist who happens to come to the province of Trentino Alto-Adige in hopes of discovering fresh sources of materials to serve as an essential foundation in his creation of new character personalities and subtle environmental atmosphere. Unfortunately, he is unable to stay a long period of time, leaving him no choice, but to detect art exhibitions to be organized in this region during his stay, in diversity of forms like monuments, scientific installations, abstract arts, and geometric abstractions, from different times such as S.P.Q.R legacies, religious extremism of dark ages, renaissance, enlightenment and contemporary arts. On top of that, he is expecting to participate in guided excursions like a bicycle trip or a hiking around the mountainous areas in an effort not to lose the precious time exploring which could be the most favourable paths, and to receive interactive explanations from the tour guide regarding the places of which he would stop to take pictures. Although the ideal travel routes he prioritizes would be better off being compact, the randomness of context would play a huge part in giving him an authentic novel inspirations

- **Anna:** a student at the university of Trento, being always busy on weekdays throughout the day; however she decides to go to the theater to watch night films within her locality on Friday nights as a way of refreshing her mind after a long week of class work. Over the weekends she prefers attending tourist events such as hiking or cycling within Trentino to make new friends. She owns a bicycle nevertheless she cannot be able to use it on Fridays since she fears riding during night ,with this she is always faced with the dilemma of which convenient means of transport to use in terms of cost, speed and availability. Besides that, by the fact that sometimes the cinema ends late Anna needs to know the available transportation from the theater to her residential area.

- **Smith:** a tourist from Canada, he always organises annual trips together with his family during his annual work leave. He chooses different countries and cities to adventure every year and this time his choice is Bolzano in Trento Italy, Smith is still confused about which part of Trentino has the most memorable events

to attend whether the North or South. Besides that he needs to find himself a fine more conducive and cost effective hotel around his destined city that suits within his budget. Smith is so passionate about attending cultural exhibitions since he loves learning more about other people's cultures so he needs to locate cultural restaurants where he can taste Italian local dishes, craft shops to enjoy seeing the Italian art.

- **Antonio:** a married man with three kids, he is an Italian native working and living in Trento together with his family, his wife works in Roveret. Every after three months the couple gets work leaves to spend some precious time together with their children, after a long period of hectic schedules. They prefer attending most of the tourist events available during that period when they are free as a way of bonding more with their children and creating precious memories to remember.Their children like playing in parks therefore sometimes they are forced to attend events where there is a park nearby. Both Antonio and his wife own cars so they decide on whose car to use per event depending on how far the event may be since his wife's car is much more comfortable compared to his. Nonetheless sometimes they need to know how far their destination is to make an informed decision. Antonio's wife likes preserving memories about most of the places they visit , most of the things she is always interested in after the event is Souvenirs so they must locate where there are Souvenir shops to buy items that remind them about their visit.

Name	Age	Interests	Usages	Description
Sofia	20	Market exhibitions, dance and opera performances	Detecting public expos displayed nearby, categorizing theatrical performances set by different aspects	Sophia, as expected from an international student, cannot speak Italian that well, also she's devoid of any cultural background. So, she could use the system for determining which performances are more universally understandable as well as quite enjoyable within the tight budget of a regular student.
Tojo	42	Guided tour, museum and other art exhibitions, gallery tour	Using the system to identify most productive, yet the least time-consuming guided tours	Optimization of his time can be easily resolved by the system. But he also might want to use the typology of event and a certain keyword to suit the application for his best need.
Anna	21	Cheap transports, hiking tour, cycling events	Locating and perceiving incoming sporting events, minimizing transport cost for doing so	All the hiking and biking around mountainous areas might engage his interest, but she also has to consider weather, duration and the possibilities of transport at the time of her return.

Smith	39	Italian cultural events, family meetings, public events	Event division by topics of discussion, detecting family meetings, overcoming language barrier	To be enjoyed by public events doesn't require anything linguistic. However, it is substantial that people coming to the meetings whose topics might interest him can comprehend and communicate to him.
Antonio	34	Weekly, monthly or flea market expo, hand-made product demonstration, movies	Searching local expos, cataloguing movie list for his family	The system may be utilized for finding variety of types of movies for all age groups within a given period. Also, it would be useful to pick up shows and entertainment for children while on a tour around the city.

2.2 Inception

This section is dedicated to the Inception phase description. Here are reported the initial definitions for CQs (Competency Queries), initial datasets collected and the relative metadata. For each of those elements the procedures and the tools adopted to achieve the results, have to be reported in the sections below.

2.2.1 Competency Queries

In order to round up a collection of **etypes** and their properties, we will make use of the following table of competency queries as to what could possibly be question instances parameterized in terms of generic questions by persona and its systemized implementations.

Per.	NO.	Question	Implementation
Sofia	1.1	Give the list of all flea market events being organized in Trentino tomorrow.	Retrieve a set of all records categorized under flea market given the current date and no constraint for the commune.
Sofia	1.2	Give the fair trade market available nearby	Return the fair trade market to be available within the closest vicinity of Trento geographically by tomorrow
Sofia	1.3	Give me the list of weekly market being organized at the weekends	Some markets operate on one specific day of weeks. Restriction on a day would definitely reduces the number of choices to visit.
Sofia	1.4	Give the markets to be in attendance until the evening.	Return the list of markets in descending order of being closed the latest to the earliest before 8:00PM.
Sofia	1.5	Give me the appointments of the market in Cornaiano	Unlike flea markets being organized once in a month, the regular markets are run on a weekly basis. Returning its time and weekdays would be the best.
Sofia	1.6	Give me the stack of theatrical performances in the next week	Retrieve all the list of every theatrical event with their specific date from today to the end of the next week.
Sofia	1.7	Give me the performances taking place in the Teatro Stabile di Bolzano	Look for the available events in the theatre in Bolzano and return them with their available date and time, prices and descriptions.
Sofia	1.8	Give me the rarest type of art performance.	Count the available days of each performance to return the ones that will be played only 3 or lower times.
Sofia	1.9	Give me the most expensive plays in the Teatro di Villazzano in November	Not all the plays have their price metadata extracted. Therefore, return the top 5 shows having the maximum prices in a specified theatre or a place chosen.
Sofia	1.10	Give me the dance and performances whose cast includes Michela Murgia.	Return the records if the director, music composer, conductor, or production attributes contain the name given by a user.
Tojo	2.1	Give the list of museum with an exactly type(monuments/science/art/geology) organized in Trentino.	Return a list of museum description contain key words monuments/science/art/geology located in Trentino.
Tojo	2.2	Give the list of bike rental shops in Trentino.	Return list of shops type of Bikes located in Trentino.
Tojo	2.3	Give the list of mountain bike routes arranged in park and friendly for beginner	Return a list of mountain bike type of bike park and with Difficulty is easy or moderate in Trentino.

Tojo	2.4	Give the list of Cycle routes is most popular and friendly for beginner in Trentino.	Return a list of hiking routes type of Top and with Difficulty is easy or moderate.
Tojo	2.5	Give the list of hiking routes is most popular and friendly for beginner in Trentino.	Return a list of hiking routes type of Top and with Difficulty is easy or moderate.
Tojo	2.6	Give the list of sporting shops in Trento.	Return a list of shop of type SportsEquipment, SportsFacilities in Trento.
Tojo	2.7	Give the list of supermarket in Trento.	Return a list of shop of type supermarket, grocery in Trento.
Tojo	2.8	Give the list of souvenir stores in Trento.	Return a list of shop type of souvenir in Trento.
Anna	3.1	Give the list of movies shown on Friday night in Trento.	A list of movies shown between 19:00 o'clock and 24:00 o'clock on Friday in Trento theater, ranked by price.
Anna	3.2	Give all trains from the theater to the station of Trento S. Bartolameo available on Friday night.	Select the station departure in station of Trento and reach the station of Trento S.Bartolameo between 19:00 o'clock and 24:00 o'clock on Friday, will be provided with a timetable.
Anna	3.3	Give the list of events arranged that take place over the weekends?	Select list events according to days and choose the days desired, a list of events that only take place on Saturdays and Sundays will be displayed, with description of the events.
Anna	3.4	Give the list of Cycle routes is most popular and friendly for beginners in Trentino.	Return a list of hiking routes type of Top and with Difficulty is easy or moderate.
Anna	3.5	Give the list of hiking routes is most popular and friendly for beginners in Trentino.	Return a list of hiking routes type of Top and with Difficulty is easy or moderate.
Smith	4.1	Which region within Trentino hosts most of the events?	Select the option for display according to region, then the system shows all the events taking place per region depending the current date.
Smith	4.2	Give the list of all hotels within Trentino that charge not more than 150euros per night?	The system will be able to display only the hotels that charge 150euros below per night.
Smith	4.3	Locate restaurants around the destined city that offer mostly Italian dishes?	A list coupled with location of the nearest restaurants that mostly prepare Italian dishes will be provided.
Smith	4.4	Where can I get a craft shop that sells mostly Italian artwork?	The system displays all the craft shops within the current area that are within a walkable distance.
Smith	4.5	Which season has the most mountain hiking events?	A season with the most number of mountain hiking events will be given including the days and time.

Smith	4.6	Give the list of days on which mountain biking takes place?	A list of events with type “mountain biking” and duration will be provided .
Smith	4.7	Give me the list of all mountains within Trentino.	Retrieves all the mountains only within Trentino that are not so high and more convenient for hiking.
Smith	4.8	Give accommodations in Trentino near children playground reachable by public transportation	Extracts and returns accommodations in the province of Trento having playground within 1500m of distance,and within 1000m from a Stop of public transportation
Antonio	5.1	Give the list of present events according to seasons.	The system displays the list of all events taking place during spring, summer,winter and autumn.
Antonio	5.2	Give the list of all nearest children parks that are within Trento?	Select parks by region and choose Trento, a list of Children parks will be displayed in the order of proximity.
Antonio	5.3	Give the distance from Trento to Molveno driving by car?	Select the starting point and the destination and then distance in KMs the distance driving by car will be calculated and displayed
Antonio	5.4	Give the shortest routes from Trento to Molveno?	The system displays a list of possible shortest routes to the desired destination according to the distance.
Antonio	5.5	Give the list of weekly market days within Trento?	Display all the markets that take place every week coupled with the time they start and end.
Antonio	5.6	Locate the market running on Thursdays?	The system will show a map directing them to the market on that particular day.
Antonio	5.7	Give the list of cultural festivals within Trentino ?	A list of cultural festivals will be displayed which will include the regions they are taking place, the date and time.

NUM	TYPES	PROPERTIES
3:1	Movie	price, type
3:5-6-7-8, 4:1-2-3	Contact	website, phone, e-mail
3:1-5, 4:1-2-3-4, 5:1-2-5-6-7	Address	province, city, village, street, number, CAP
3:1-2, 4:1-5-6, 5:1-5-6-7	Timetable	Schedule
4:3	Restaurant	price, type
3:6-7-8, 4:1	Description	text
3:6-7-8, 4:1-5-6, 5:1-5-6-7	Event	type
4:2	Hotel	price, stars, parking, number of beds, wellness
4:4	Shop	type, offer
4:5-6, 5:1	Season	type

3:2	Park	type
3:2, 5:3-4	Point	altitude, latitude, longitude

2.2.2 Initial Datasets description

Since we are focusing on the events being organised in Trento, we decided to work with the local datasets. To retrieve the local events we have chosen the website www.trentino.com, listing various events like 'Farmer's markets', 'Festivals', 'Guided tours' etc. being held in the Trento area on a given date. The listed events contain information on the dates, timings and location with exact longitudes and latitudes of the event with the relevant contact information. Another important category of tourist event is cinema. So, we utilized the website www.crushsite.it. It is an on-line agenda of culture, art and entertainment . It contains the events organized in Trentino and the main initiatives of Alto Adige , some sector news , the files of over ninety regional cultural subjects involved in the project. The website provides details of the cinema being released in the local theatres with the details on the movie's cast, director, language, genre, duration in minutes and the most important address of the theatre and the ticket booking information. To gather more data on the evnets organized in Trento we used another website www.visittrentino.info which presents a list of events with their start and end dates, timings, address, type of the events, organizer's contact information, location in lat/long etc.

2.2.3 Datasets metadata documentation

Dataset no.	Attribute	Type	Description
Events (1)	Period	date	Starting and ending dates for the specific event to happen. While some events are organized spanning over a week, some happen once. Date format has been given as *dd/mm/yyyy*.
Events (1)	Località	string	An address referring to the commune in which the event is taking place.
Events (1)	Tipologia	string	Isolated by commas, the string points out the categories the event falls under.
Events (1)	Orari	time	Given multiple pairs of starting and ending hours, it tells us time options corresponding to particular weekdays or different intervals as to the same day.
Events (1)	Organizzazione	string	Event organizer entities are given in forms of a pair of their names such as "Apt Rovereto e Vallagarina" and the telephone number.
Events (1)	Location	lat/long	Precise location data attribute to point out where in the commune, the event is about to be arranged. A lot of preprocessing and data cleaning steps are necessary.
Movies (2)	Title	string	The name of the movie.
Movies (2)	startDate	date	Starting date since when the movie would be release for public. Written in the format *yyyy-mm-dd*.
Movies (2)	endDate	date	Ending date until when the movie could be watched. Written in the format *yyyy-mm-dd*.

Movies (2)	Data	string	Date period is given in a form more suited for human consumption, for instance *da Gio. 22 a Mar. 27 ottobre 2020*
Movies (2)	Orario	string	A set of time periods, each of which corresponds to a particular day of a week as well as the date itself. For example, *Giovedì 22: 17.00 / Venerdì 23: 17.00 / Sabato 24: 15.30 – 17.30.*
Movies (2)	Dove	string	Which cinema is it that the movie is being released. Highly likely to be a stack of cinema names, such as *Teatro Comunale, Piazza Garibaldi 5/g, Pergine Valsugana (Tn).*
Movies (2)	Note	string	Information regarding where to buy the tickets, contact details and possible price tags attached.
Movies (2)	RegiaDi	string	Name of the director.
Movies (2)	Con	list	The cast of actors and actresses. *(e.g. Con Gotz Otto, Daniel Donskoy, Peter Simonischek, Bibiana Beglau, Mehdi Meskar.)*
Movies (2)	Nazione	string	Original nationality of where the movie came from, in Italian.
Movies (2)	Durata	integer	Duration of the movie in minutes.
Movies (2)	Genere	string	Which category of movies does the film belong to? (animazione, commedia, drammatico etc.)
Events (3)	Image	string	A Universal Resource Identifier about the image indicating the event.
Events (3)	Name	string	Name of the event; they include mostly flea market, weekly and monthly markets, but sometimes other events such as biking, hiking and guided tours.
Events (3)	startDate	string	the events from this dataset usually don't transpire across many days, meaning this date is the only day the event is managed.
Events (3)	Duration	string	Duration about how long the event is expected to continue after the time given in its startDate.
Events (3)	URL	string	More elaborations could be found by following the resource locator.
Events (3)	Commune	string	A single term expression indicating which commune is the event happening.
Events (3)	Address	string	Name of the place in combination with the commune.
Events (3)	Latitude	double	Latitude of the address.
Events (3)	Longitude	double	Longitude of the address.

2.2.4 Datasets collection process

The data required for building a knowledge graph on the tourist events is not readily available on the web, hence we decided to use web-scraping techniques to retrieve the data from the websites listed in section 2.2.2 by writing a script in Python. To do so we have used the 'BeautifulSoup' package which is a Python package for parsing HTML and XML documents. As the first step we identified the relevant websites which have information on local events. We narrowed down to three websites as explained in section 2.2.2 and decided to extract a list of all the events till December 2020. In the second step we collected all the hyperlinks of all the events in a list. These hyperlinks contain detailed information of the event which we need to extract. Now, as the final step we identified

the important attributes like the name, place, time, location, type of the event etc. from these hyperlinks which will define our queries and the script extracted the values of these attributes one by one from the hyperlinks. This assured systemic data extraction and uniformity in the datasets.

2.2.5 Inception level evaluation

As a result of having comparisons between the datasets currently at our disposal that we have scraped and the competency query sets, we have estimated that the coverage is around 0.23% and the flexibility 76.31%.

2.3 Informal Modeling

This section is dedicated to the Informal Modeling phase description. The Section is divided in Schema and Data level in order to report the details of the elements involved in the generation of the schema, as well as the description of the datasets evolution in this phase. Moreover a specif section, one for each level, reports the difference between the elements defined in this phase and the definitions in the previous phase, analyzing in this way the variance in the different phases.

2.3.1 Schema level

The schema level in this phase report the first informal definition of the ETypes and of the EER model constructed using them.

2.3.1.1 ETypes and EER Model definition

This section reports an informal definition of the ETypes involved in the datasets collected in the previous phase. This section includes a list of metadata associated to each of the elements generated.

2.3.1.2 Variance respect CQs definition

This section aims to define the variance between the schema elements produced in this phase, and the definition of the CQs reported in the previous phase. This a way to define the quality of the outcomes for the current phase as well as the alignment of the overall project development process.

2.3.2 Data level

The data level section in this phase reports the evolution of the datasets collected previously, reporting the metadata information for each new data, or new version of data, obtained.

2.3.2.1 Datasets management process

During the Informal Modeling phase the datasets collected in the previous phase are filtered and managed in order to obtain more suitable sets of data. In this section are described the procedures adopted to obtain that result.

2.3.2.2 Datasets metadata documentation

In this section is reported a list of new metadata in order to describe the modification performed on each datasets and attribute, to achieve the new version of the datasets.

2.3.2.3 Variance respect Inception datasets

This section aims to define the variance between the data elements (datasets and attributes within them) produced in this phase, and the initial datasets collected in the previous phase. This a way to define the quality of the outcomes for the current phase as well as the alignment of the overall project development process.

2.3.3 Informal Modeling Evaluation

The last section of the Informal Modeling phase report the evaluation of the outcomes obtained in this phase, through specif evaluation metrics.

2.4 Formal Modeling

This section is dedicated to the Formal Modeling phase description. The Section is divided in Schema and Data level in order to report the details regarding both the ontology generated and the datasets version in the current phase.

2.4.1 Schema level

The schema level section in the current phase, reports the detailed description of the ontology generation.

2.4.1.1 Ontology definition

This section reports in details how the ontology is generated stating from the informal schema of the previous phase, which tools are used to do that, as well as usage of external ontology resources adopted to obtain the final KG ontology. Moreover a list of metadata is reported in this section, in order to describe all the elements of the ontology defined.

2.4.1.2 Variance respect to the EER Model

Once the ontology has been built, this section report the differences, and so the variance, respect the EER model defined in the previous phase. This a way to define the quality of the outcomes for the current phase as well as the alignment of the overall project development process.

2.4.2 Data level

As in the previous phase the data level section here, reports the description of the new version of the datasets, after formatting operations.

2.4.2.1 Formal Modeling datasets management

In this section are reported the operations and the tools adopted to format the dataset collected, in order to align them to the ontology definitions generated at schema level.

2.4.2.2 Datasets metadata documentation

In this section eventually new metadata information are added in order to describe the evolution of the datasets.

2.4.2.3 Variance respect Informal Modeling datasets

This section aims to define the variance between the data elements (datasets and attributes within them) produced in this phase, and the initial datasets collected in the previous phase. This a way to define the quality of the outcomes for the current phase as well as the alignment of the overall project development process.

2.4.3 Formal Modeling Evaluation

The last section of the Formal Modeling phase report the evaluation of the outcomes obtained in this phase, through specif evaluation metrics.

2.5 Data integration

This section is dedicated to the Data Integration phase description.

2.5.1 Data integration operations and tool

This section is dedicated to the description of the usage of the data integration tool that allows to map the datasets generated and well formatted in the previous phases, with the final ontology generated. The last datasets adaptation performed using the tool, as well as the mapping operation are here detailed.

2.5.2 Variance respect Formal Modeling datasets

The last section of the data integration phase aims to describe the variance, analyzing the differences, between the datasets integrated with the ontology, in the data integration platform which contain the KG, and the datasets collected in the previous phase. This analysis can highlight the results of the operations performed during the final phase of the data integration process.