Intelligent Agents
Ontology Report

Tjalle Galama, 6936385 Ernö Groeneweg, 4279662
Otto Mättas, 6324363 Shaoya Ren, 6850413 Vincent de Wit, 6970877

September 2019

For our ontology design we decided to add time constraints, classroom and lecturer to the given classes of course, methodology, topic and student. The time-class seemed obvious, considering that it is difficult to follow two courses taught in the same time slot. This way a student could ask for a course taught at a specific time, or only query courses that are taught in time slots that no other planned course is taught in. Additionally, we could query the system to not plan any courses that are taught on a specific day, to alleviate scheduling conflicts with extracurricular activities. So, in order to achieve this, the time class has subclasses semester, day and slot. Location and lecturer are added classes for the sake of user preference. This way, one could add courses taught by a specific lecturer or at a specific location, or omit courses taught by lecturers or given at locations that don't work for the student. These classes allow a great degree of personalisation in the students' course load.

Most of the relations we added are pretty straightforward: a topic is covered in a course, a course is taught via a methodology, a course is taught in a classroom, a lecturer teaches a course. For courses, we added relations that allow not only having one course be a prerequisite for another, but also checking similarity between courses. This similarity could come from similar topics or methodologies, or another arbitrary metric. A student can have a previously taken course, and a course has a set of students that are already enrolled in it. Combine this with the reflexive friends-relation of the students, and one could query the system to sign up for a course that one of their friends is also taking. The preference-relation from student to lecturer has been included to make sure that the user can query whether their friends prefer a certain lecturer, which may influence their decision to enroll in a course. Their is also an overlap relation on topics, so maybe the user could apply to multiple courses on a specific topic or maybe take very different courses for variety. Lastly we mapped time slots to the days they're taught on.

This ontology will allow for a number of queries, some of which may be: "I don't want courses that are taught by lecturer X", "Schedule me for a course about machine learning that is taught by someone my friends prefer", "I don't want any courses taught in this classroom", "In the first semester, I don't want any courses taught on fridays, but in the second semester I don't want any courses taught on mondays", "Sign me up for all courses on multi-agent systems that include lectures, but no labs", "What courses on cognitive modelling taught on Mondays and Wednesdays do I meet the prerequisites for?". These are just some examples, but this will be most of the preferences that a student will be able to account for. Additionally, something like a prerequisite relation could be always enforced, with the system never returning any courses that the student does not meet the prerequisites for, or it could be ignored, since there could be ways a student could enroll in a course they technically do not meet the prerequisites for in consultation with the lecturer. Below, we have included our ontology expressed in Description Logic, as well as a visual representation of our ontology.

Ontology Design

$$
\begin{aligned}
\text{course} &\sqsubseteq \top \\
\text{methodology} &\sqsubseteq \top \\
\text{topic} &\sqsubseteq \top \\
\text{student} &\sqsubseteq \top \\
\text{lecturer} &\sqsubseteq \top \\
\text{classroom} &\sqsubseteq \top \\
\text{time} &\sqsubseteq \top \\
\text{day} &\sqsubseteq \text{time} \\
\text{semester} &\sqsubseteq \text{time} \\
\text{slot} &\sqsubseteq \text{time}
\end{aligned}
$$

$$
\begin{aligned}
\text{course} &\sqsubseteq \exists \text{isThaughtAt.time} \\
\text{course} &\sqsubseteq \exists \text{isThaughtIn.classroom} \\
\text{course} &\sqsubseteq \exists \text{isThaughtVia.methodology} \\
\text{course} &\sqsubseteq \exists \text{isThaughtBy.lecturer} \\
\text{course} &\sqsubseteq \exists \text{isLearnedBy.student} \\
\text{course} &\sqsubseteq \exists \text{isRequiredFor.course} \\
\text{course} &\sqsubseteq \exists \text{isSimilarTo.course} \\
\text{course} &\sqsubseteq \exists \text{isOverlappedBy.course} \\
\text{topic} &\sqsubseteq \exists \text{isCoveredIn.course} \\
\text{slot} &\sqsubseteq \exists \text{isSetOn.day} \\
\text{student} &\sqsubseteq \exists \text{isFriendsWith.student} \\
\text{student} &\sqsubseteq \exists \text{hasPreferenceFor.lecturer} \\
\text{student} &\sqsubseteq \exists \text{hasTakenPreviously.course}
\end{aligned}
$$

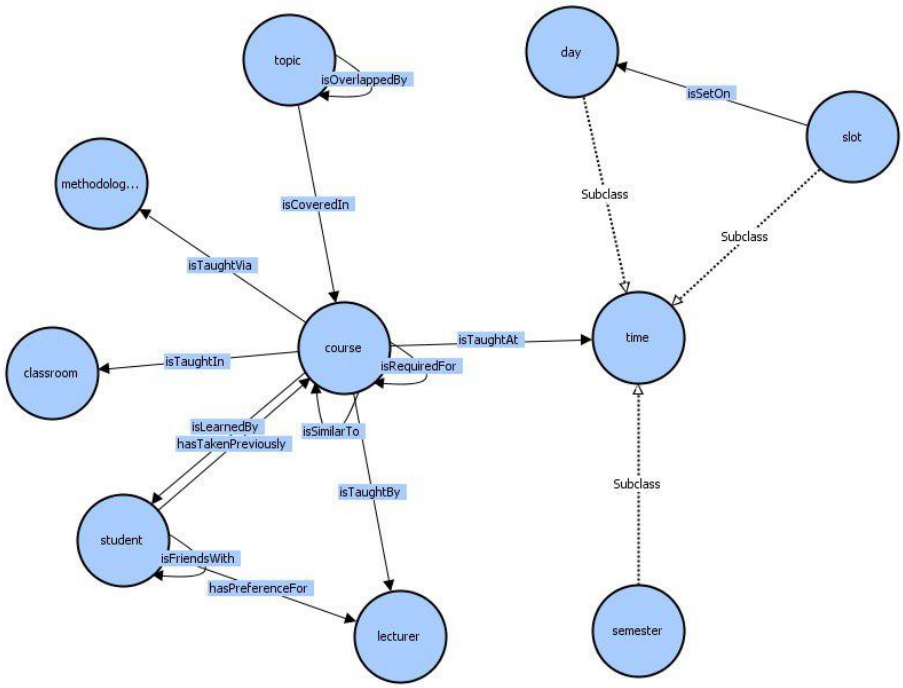

Figure 1: A visualisation of our Ontology, using VOWL.