

## 1. Transducers

- The **mm2mmm** transducer diverges in two paths, one for months numbered *01* through *09* and another for months starting from *10*.
- The two **d2dd** and **d2dddd** transducers are *non-deterministic* and include one path for numbers with 2 or more digits (4 or more digits for the latter), that simply loops and copies the digits to the output. And another path for a lower number of digits, which adds the padding zeros.
- The **copy** and **skip** transducers are immediate and simply take whatever input and either output itself or output an *eps* symbol.
- The **date2year** transducer skips two *digit-digit-slash* sections until it copies 4 digits.
- The **leap** transducer takes to account that leap years are every year divisible by 4, or by 400 if it is also divisible by 100. Since the only year divisible by 100 in the given interval is 2000, which is divisible by 400, we can ignore that restriction, and simply check if the two last digits are divisible by 4.
- The **R2A** transducer is internally composed of sections that deal with particular letters. For instance, the state after finding the symbol *L* is connected to the sections that deal with *I*, *V*, and *X*, because they're the only letters that can follow *L* to the right.

## 2. FST Operations

- The **A2R** transducer is immediate and is the inversion of the *R2A* transducer.
- The **birthR2A** transducer is the concatenation of the composition of *R2A* and *d2dd* (to accept single-digit days and output them with padding zero) with *copy* (for the *"/*" after the day part of the date). This part is concatenated with itself (to handle the month part of the date) and is finally concatenated with the composition of *R2A* with *d2dddd* (to handle the year part of the date and output years with 4 digits, if padding zero is necessary).
- The **birthA2T** transducer is composed by multiple concatenations of the *copy* transducer to copy the date and year part of the dates. Inbetween those two parts, there's a concatenated *mm2mmm* transducer, converting the numbered month to text.
- The **birthT2R** transducer is the concatenation of: the *day* transducer, the composition of the inversion of *d2dd* and *A2R*, a transducer that can convert numbers with padding zero to roman numerals; the *month* transducer, the composition of the inversion of *mm2mmm* with the inversion of *d2dd* and *A2R*, a transducer that converts text months into roman numerals; and finally, the *year* transducer, composed similarly to the *day* transducer, but with the inversion of *d2dddd* instead of *d2dd*. Two *copy* are also concatenated in-between every two parts, to handle the *"/*" symbols.
- The **birthR2L** transducer is the composition of *birthR2A* with *date2year* and *leap*.

## Contribution

- **Nuno Laranjo** 90760 - 50%: Some transducers from section 1 and most transducers from section 2; Wrote tests and part of script; Worked on report.
- **Leonor Veloso** 92509 - 50%: Most transducers from section 1 and some transducers from section 2; Wrote tests and part of script; Worked on report.