Case studies for the paper “Evrostos: The rLTL Verifier”.

These are the instructions to replicate the LTL case studies for the paper “Evrostos: The rLTL Verifier”.
We provide for your ease the LTLmodelcheck.c script which runs iteratively NuSMV to obtain the LTL model checking results for all the LTL formulas used with each model.
Compile it using:

```
gcc -w LTLmodelcheck.c -o ltlmodelcheck
```

1. Section 2: Motivational Example (LTL):

The files needed for this simulation are:

- input_mot_example_LTL.txt
- mot_example_aac.smv

Run the following on the terminal from inside the Evrostos directory:

```
./ltlmodelcheck -I
```

The terminal looks as follows:

```
Enter the rLTL specification input file name (.txt):
```

You enter:
./examples/input_mot_example_LTL.txt

```
Enter the model file name (.smv):
```

You enter:
./examples/mot_example.smv

```
Enter file name (.txt) for the report:
```

You enter:
mot_exampleLTLReport.txt

Now the result of the rLTL model checking is in the report file.

Legend:

- atomic proposition “ta12non" stands for "alert12 = non”;
- atomic proposition “ta13non" stands for "alert13 = non”;
- atomic proposition “tsctr1" stands for "tsafeControl1”.

2. Section 5: Telephone System Model (LTL):

The files needed for this simulation are:

- inputPhone_LTL.txt
- telephone.smv

Run the following on the terminal from inside the Evrostos directory:

```
./ltlmodelcheck -I
```

The terminal looks as follows:

```
Enter the LTL specification input file name (.txt):
```

You enter:
./examples/inputPhone_LTL.txt

```
Enter the model file name (.smv):
```

You enter:
./examples/telephone.smv

```
Enter file name (.txt) for the report:
```
You enter:
telephone_LTL_Report.txt

Now the result of the LTL model checking is in the report file.

3. Section 5: Automated Air Traffic Control System Model (Original) (LTL):

The files needed for this simulation are:

- inputAAC_LTL.txt
- aac_original.smv

Run the following on the terminal from inside the Evrostos directory:

```
./ltlmodelcheck -I
```

The terminal looks as follows:

```
Enter the LTL specification input file name (.txt):
```
You enter:
./examples/inputAAC_LTL.txt
```
Enter the model file name (.smv):
```
You enter:
./examples/aac_original.smv
```
Enter file name (.txt) for the report:
```
You enter:
aac_original_LTL_Report.txt

Now the result of the LTL model checking is in the report file.

4. Section 5: Automated Air Traffic Control System Model (Abstract) (LTL):

The files needed for this simulation are:

- inputAAC_LTL.txt
- aac_abstract.smv

Run the following on the terminal from inside the Evrostos directory:

```
./ltlmodelcheck -I
```

The terminal looks as follows:

```
Enter the LTL specification input file name (.txt):
```
You enter:
./examples/inputAAC_LTL.txt
```
Enter the model file name (.smv):
```
You enter:
./examples/aac_abstract.smv
```
Enter file name (.txt) for the report:
```
You enter:
aac_abstract_LTL_Report.txt

Now the result of the LTL model checking is in the report file.

5. References:

- Evrostos: The rLTL Verifier
  Tzanis Anevlavis, Daniel Neider, Matthew Philippe and Paulo Tabuada
  To appear in the 22nd ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2019).

- A. Cimatti, E. Clarke, E. Giunchiglia, F. Giunchiglia, M. Pistore, M. Roveri, R. Sebastiani, and A. Tacchella.
  "NuSMV 2: An OpenSource Tool for Symbolic Model Checking".
  In Proc. CAV'02, LNCS. Springer Verlag, 2002.

- Telephone System Model:
  Malte Plath and Mark Ryan. 2001. Feature integration using a feature construct. Science of Computer Programming 41, 1 (2001), 53 – 84.

- Automated Air Traffic Control System Model:
  Yang Zhao and Kristin Yvonne Rozier. 2014. Formal Specification and Verification of a Coordination Protocol for an Automated Air Traffic Control System. Sci. Comput. Program. 96, P3 (Dec. 2014), 337–353.