Task 9.2: Extraction of drug-drug interactions.

The goal of this subtask is the extraction of drug-drug interactions from biomedical texts. A drug-drug interaction occurs when one drug influences the level or activity of another drug (e.g. *Acetazolamide reduces urinary excretion of quinidine and may enhance its effect*.).

The definition of this subtask almost remains the same as DDIExtraction 2011 (http://labda.inf.uc3m.es/DDIExtraction2011/). With the unchanged task definition, the purpose of running this task is to measure the progress of the community on the task. However, while the DDIExtraction 2011 task focused on the identification of all possible pair of interacting drugs, DDIExtraction 2013 also pursues the classification of each drug-drug interaction according to one of the four following types (please you must read our guidelines):

1. **Advice**: this category is assigned to those drug-drug interactions in which a recommendation or advice regarding the concomitant use of two drugs involved in them is described. Some examples of this type of drug-drug interactions are:
    - "Interactions may be expected, and **UROXATRAL** should NOT be used in combination with other **alpha-blockers**."
    - Literature reports suggest that oral **calcium antagonists** may be used in combination with **beta-adrenergic blocking** agents when heart function is normal, but should be avoided in patients with impaired cardiac function.
    - Because of **foscarnets** tendency to cause renal impairment, the use of **FOSCAVIR** should be avoided in combination with potentially nephrotoxic drugs such as **aminoglycosides**, **amphotericin B** and intravenous **pentamidine** unless the potential benefits outweigh the risks to the patient.
2. **Effect**: this type is assigned when the effect of the drug-drug interaction is described. The effect can be a pharmacological effect, a clinical finding, sings or symptons, an unspecific modification of the effect or action of one of the drugs, an increased of the toxicity or a protective effect, or therapeutic failure. Likewise, this type is assigned when the sentence describes a pharmacodynamic effect or mechanism of interaction (see guidelines). The detection of the effect is not required in this task. Some examples are shown below:
    - Some **quinolones**, including **ciprofloxacin**, have been associated with transient elevations in serum creatinine in patients receiving **cyclosporine** concomitantly.
    - The concomitant administration of **ciprofloxacin** with the **sulfonylurea glyburide** has, on rare occasions, resulted in severe hypoglycemia.

- In uninfected volunteers, 46% developed rash while receiving **SUSTIVA** and **clarithromycin**.
- **Quinolones** may enhance the effects of the oral anticoagulant, **warfarin**, or its derivatives.
- Use of **Cerubidine** in a patient who has previously received **doxorubicin** increases the risk of cardiotoxicity.
- **Methionine** may protect against the ototoxic effects of **gentamicin**.
- **Chlorthalidone** may add to or potentiate the action of other **antihypertensive drugs**.
- Antagonism has been demonstrated between **clindamycin** and **erythromycin** in vitro.

3. **mechanism**: The mechanism of interaction can be **pharmacodynamic** (the effects of one drug are changed by the presence of another drug at its site of action, for example, "*alcohol potenciated the depressor effect of barbiturates*") or **pharmacokinetic** (the processes by which drugs are absorbed, distributed, metabolised and excreted are affected, for example, ("*induced the metabolism of*", "*increased the clearance of*") (Baxter & Stockely, 2010). In this corpus, however, the type mechanism is assigned when a pharmacokinetic mechanism is described, including changes in levels or concentration of the entities (see guidelines). As already noted, a pharmacodynamic relationship between entitys must be considered type effect. Some examples of type mechanism ddi are shown below:
    - **Grepafloxacin**, like other **quinolones**, may inhibit the metabolism of **caffeine** and **theobromine**.
    - **Grepafloxacin** is a competitive inhibitor of the metabolism of **theophylline**.
    - Blood levels of **hydrodolasetron** increased 24% when **dolasetron** was coadministered with **cimetidine** (nonselective inhibitor of cytochrome P-450) for 7 days, and decreased 28% with coadministration of **rifampin** (potent inducer of cytochrome P-450) for 7 days.
    - Elevated plasma levels of **theophylline** have been reported with concomitant **quinolone** use.

4. **int**: this type is assigned when the sentence simply states that an interaction occurs and does not provide any information about the interaction.
    - The interaction of **omeprazole** and **ketoconazole** has been stablished.

Drug interactions involving food or drinks are considered of scope for the task. **Please consult our guidelines for more detailed information.**

Named entity recognition is not necessary to address the task because gold standard annotations (correct, human-created annotations) of pharmacological substances are provided to participants both for training and test data.

Output Format

For evaluation, a held-out part of the same corpus, consisting of 161 documents from DrugBank and 34 MedLine abstracts, will be provided with the gold annotation hidden for drug-drug interactions, however gold standard annotations of pharmacological substances are provided to participants both for training and test data. The goal for participating systems is to recreate the gold annotation.

Participant systems will be required to return a list that includes all pairs of drugs in each sentence and its prediction. It should be remembered that only DDIs occurring within the text unit of a sentence are to be considered for this task. Each participant system must output an ASCII list including all pairs of drugs in each sentence, one per line, its prediction (1 if the pair is a DDI and 0 e.o.c) and its type, and formatted as:

```
IdSentence|IdDrug1|IdDrug2|prediction|type
```

where

- **IdSentence** is from the sentence
- **idDrug1, idDrug2**: are the identifiers of the drugs (gold annotation provided by the organizers) in the candidate pair.
- **prediction**: its value must be 1 when the candidate pair is predicted to be a DDI, and 0 e.o.c.
- **type** corresponds to the type of the drug-drug interaction according to the types described above. Please, label **null** when the prediction value is 0.

Multiple ddis from the same sentence should appear on separate lines. A sentence is not required to have any ddis.

Up to three runs may be submitted by each team. Details about submission procedures will be communicated through our web site. A script will be made available to ensure that submission files comply with the prescribed format.

Evaluation

Evaluation is relation-oriented and based on the standard precision, recall and F-score metrics. Note that only relations are evaluated. Relations output by participating systems are correct if the prediction label matches in the gold annotation.

File naming conventions

All files in the task follow the same naming convention:

task9.2_GROUP_RUN.txt

where:

- GROUP is necessary to identify which group made the submission.
- RUN is a integer value between 1 and 3, to distinguish multiple submissions.

For example, the UC3M team may submit the following files for the DDI Extraction subtask: task9.2_UC3M _1.txt, task9.2_UC3M _2.txt, task9.2_UC3M _3.txt.