**Statistics and Exploratory Data Analysis**

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**Laboratory: ANOVA & related**

In each exercise use a **significance level of 0.05.**

**Exercise 1:**

1. Download and install a library *datasets.* Use a dataset *chickwts*.
2. Perform a pre-analysis to assess whether comparison between weights of chickens depending on feed type is worth considering.
3. Decide which test is the most appropriate for checking whether weights of chickens depending on feed type are statistically different.
4. Is there enough evidence to support a claim that weights of chickens depend on feed type?
5. Which feed type(s) make chickens the heaviest?

**Exercise 2:**

1. Download and install a library *datasets.* Use a dataset *chickwts*.
2. Decide which test is the most appropriate for checking effectiveness of different sprays against insects.
3. Is there enough evidence to support a claim that effectiveness is not equal for all sprays?
4. Which spray(s) is the most effective?

**Exercise 3:**

1. Download and install a library *datasets.* Use a dataset *USJudgeRatings*. Upload library *tidyr* an using *gather()* function create a data frame with 3 variables: ability (different abilities assessed for each judge), grade & block (name of each judge).
2. Decide which test is the most appropriate for checking whether grades for each ability are statistically indifferent.
3. Is there enough evidence to support a claim that grades are not equal for all abilities?
4. Which ability(ies) is the best graded?

**Exercise 4:**

1. Download and install a library *datasets.* Use a dataset *ToothGrowth*. Change the variable *dose* to a non-ordered factor.
2. Decide which test is the most appropriate for assessing a supplement used and a dose of the supplement to a teeth growth.
3. Is there enough evidence to support a claim that:
   1. neither supplement type nor dose have an influence on teeth growth?
   2. supplement type does not have influence on teeth growth?
   3. dose does not have influence on teeth growth?
   4. dose has a different influence on supplements efficiency?
4. Is there any dose were results for both supplements are statistically indifferent?
5. Draw an interaction plot.

**Exercise 5:**

1. Download and install a library *datasets.* Use a dataset *ChickWeight*.
2. Decide which test is the most appropriate for assessing a Diets influence on chicks weights in Time. Using AIC criterion decide which specification is the most appropriate.
3. Is there enough evidence to support a claim that:
   1. neither Diet nor Time have an influence on chicks growth?
   2. Diet does not have influence on teeth growth?
   3. Time does not have influence on teeth growth?
   4. Time has a different influence on Diet efficiency?
4. Draw an groupwise mean plot. Which Diet seems to be the most effective?
5. Which diet is the most effective after 21 days (hint: in *lsmeans()* use at=list(Time=c(21))?