Implementation of software and hardware of free access for the technological solution to illustrate physical phenomena in the classroom in a didactically and pedagogical way

For more information and laboratory setups.

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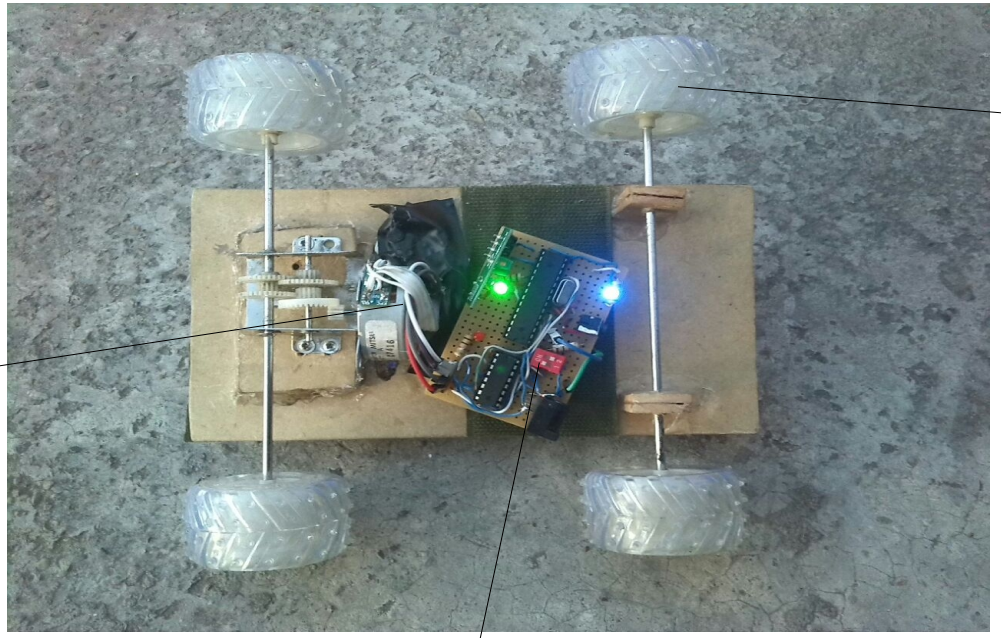
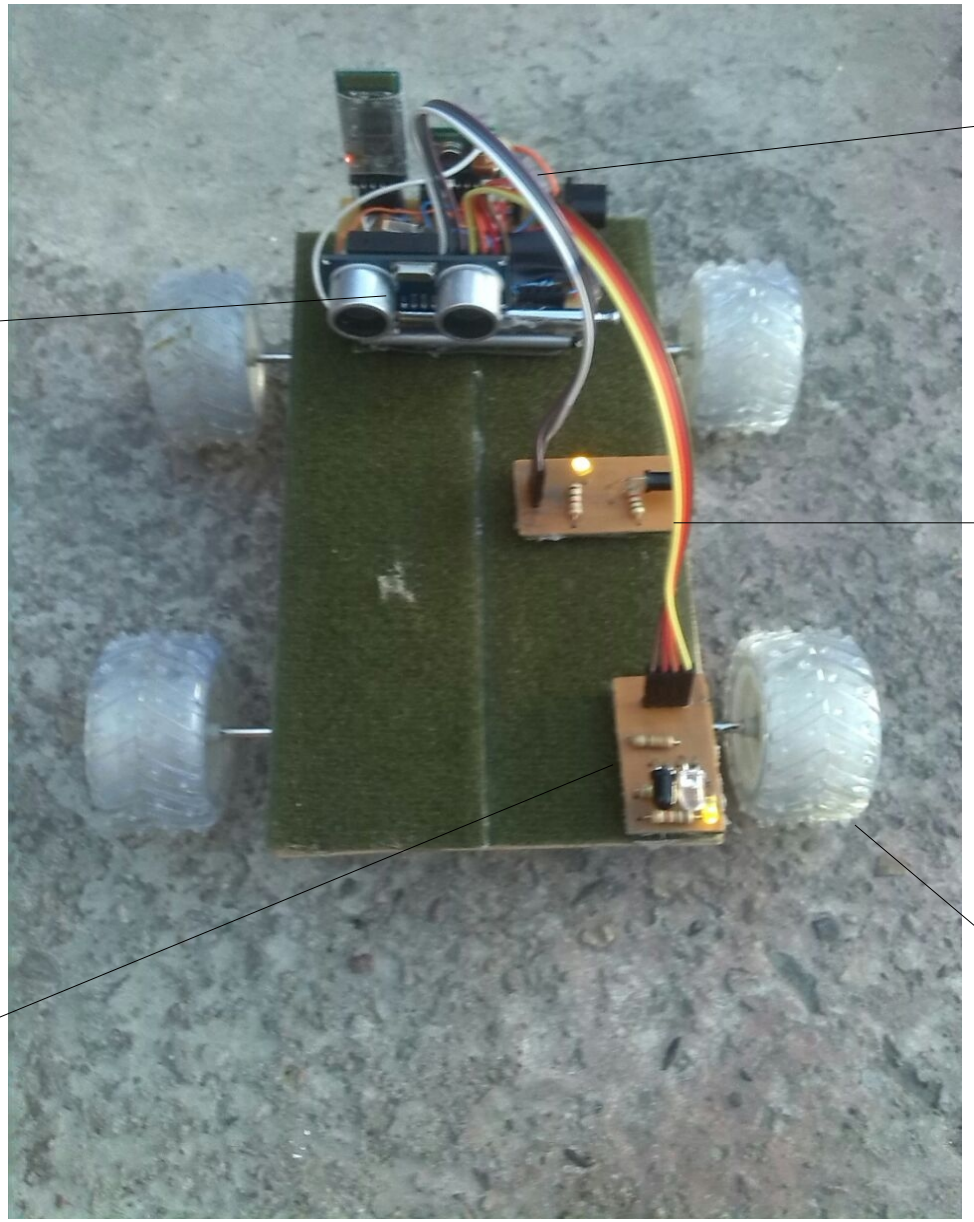
Vehicle

This vehicle is hardware to free access and this is controlled for android and GNU-Linux platform or smart glass BT-200 moveiro device to EPSON.

This software is to free access and development in a python language.





Ultra-sound sensor

data acquisition card with radio frequency and bluetooth communication

Sensor based to passive electro-reception

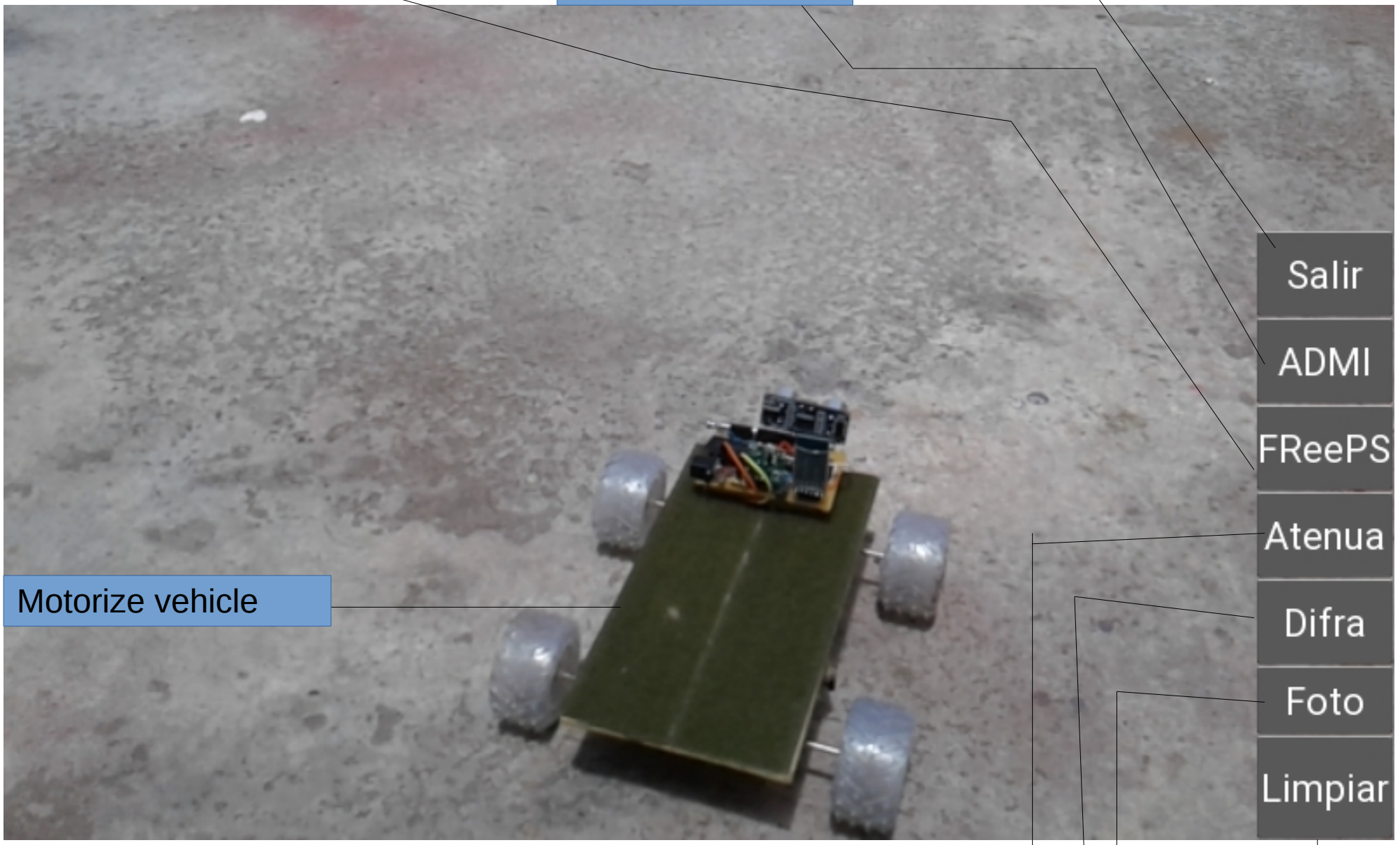
VELCRO

Sensor based to Active electro-reception

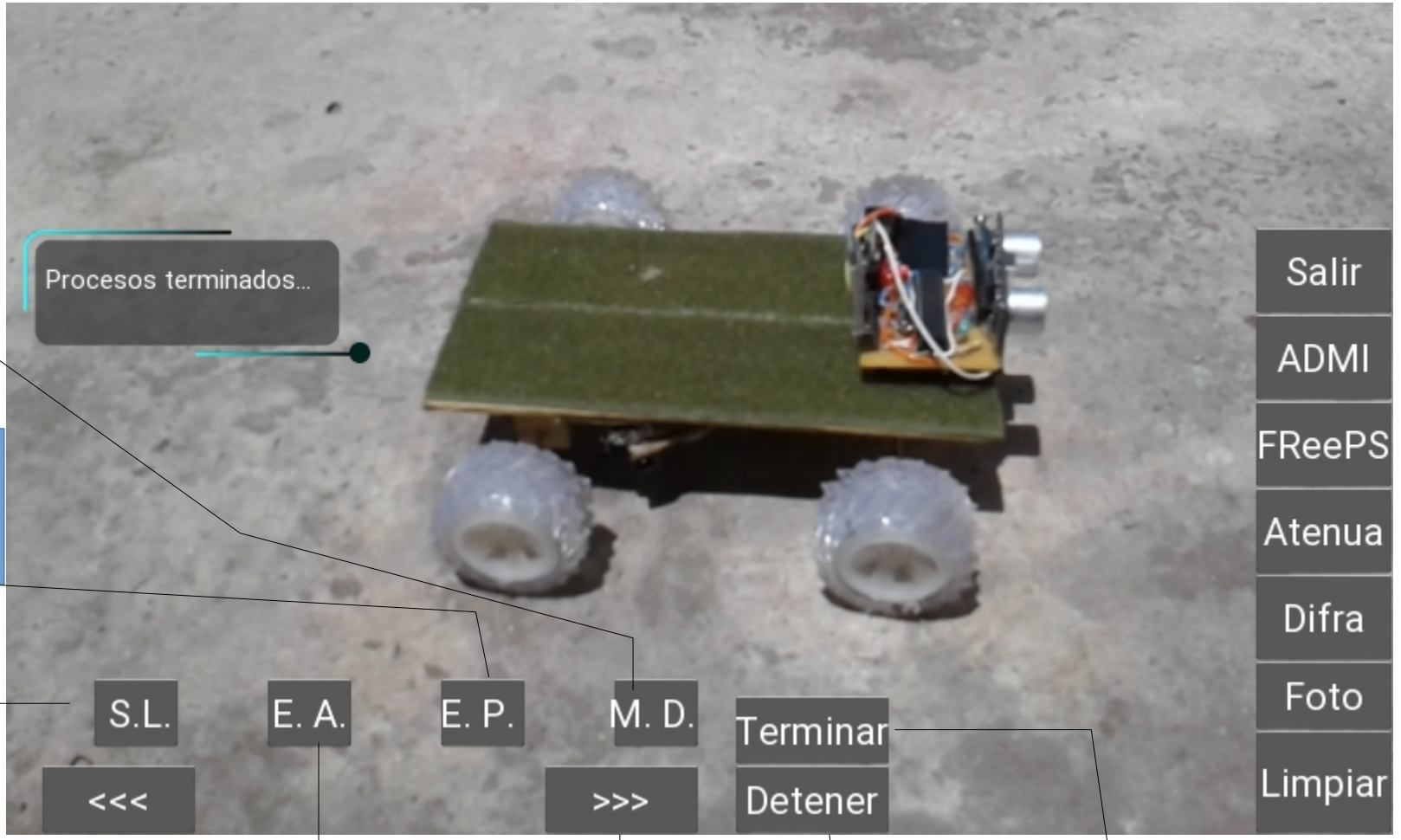
APP

- FREinfraROSI is software to free access, writing this app in a python language and build this in a GNU-Linux platform.

- With this app, can development physical laboratory, but example free harmonic movement, calculate to decay coefficient to the flux, Law of decay radiation flux density, and visualize diffraction experiment.


• free harmonic movement
Sensor and move car button
Exit button
Salir
ADMI
FReePS
Atenua
Difra
Foto
Limpiar
Motorize vehicle
Law of decay radiation flux density
Diffraction button
Capture image button
Clear Button

Sensor and move car button



measure length button

Pasive electro-reception button

Light sensor button

Move car to rigth button

Active electro-reception button

Move car to rigth button

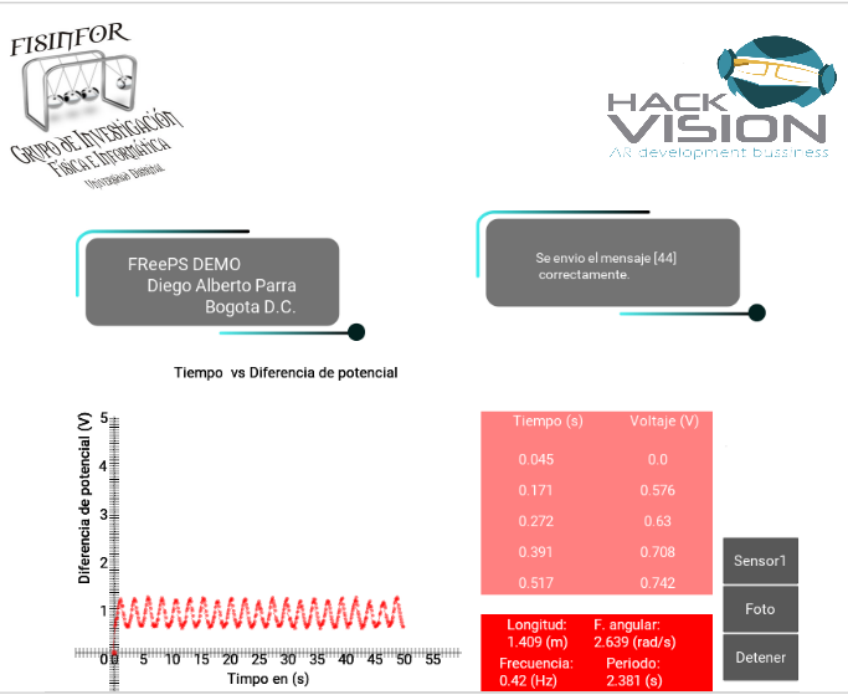
Stop button

Finish button

length of one rope from a count the oscillations

Put data acquisition card with sensor based to active electro-reception and the system mass-rope in front, use a software FreePS in a device android or a smart glass BT-200 EPSON.

FReePS software begin to communication bluetooth with a acquisition card, and count a oscillation to system mass in a rope.



$(T^2)/(4 * \pi^2) = (L / g);$ $g / (4 * f^2 * \pi^2) = L$

g = gravity acceleration L = length string in meter
Π = 3.14159265 f = Frequency
T = oscillation period

Law of decay radiation flux density

Put a mirror in front to the vehicle at a distance of 8.5 cm, the vehicle move 2 mm parallel to the radiation flux, which flux decays with the inverse distance squared to distance of separation to the source. Acquisition card with the sensor active electro-reception, capture the data and sends it to the device, which uses a logarithmic linear regression to find the exponent of radiation decay because of changing in the distance and calculates a density flux of radiation means emitted by the diode.

Calculate exponent and flux density

$E = d\Phi/ds$ $I = d\Phi/d\omega$

.

$d\omega = ds/r^2$ $E = I/r^2$

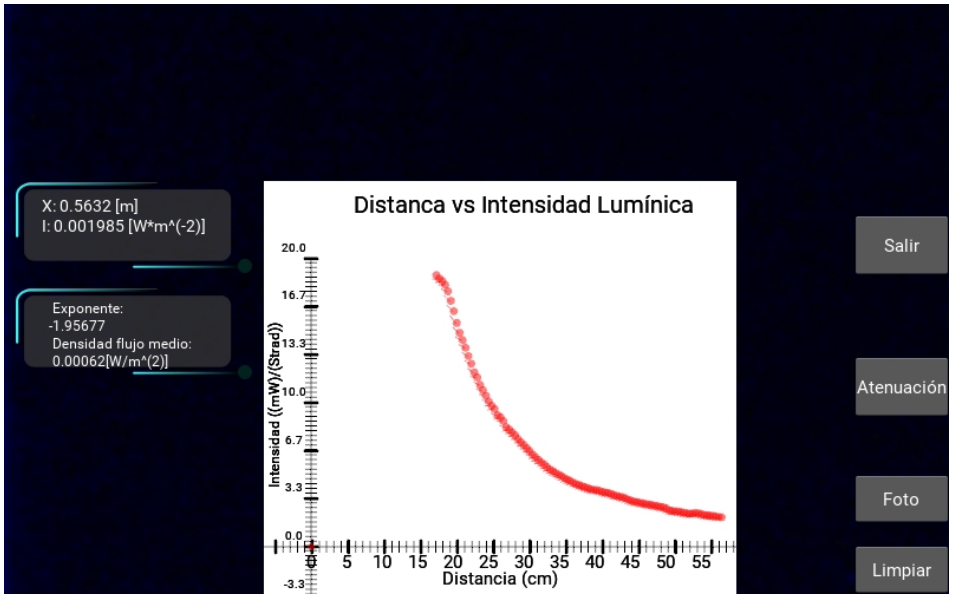
Statistics

$$ln(Y^*) = ln(a) + bln(X) \cdots \Longrightarrow V^* = A + bU,$$

Exponent $$b = \frac{S_{UV}}{S_U^2} = \frac{\frac{1}{n}\sum_{i=1}^{n} UV - \bar{U}\bar{V}}{\frac{1}{n}\sum_{i=1}^{n} U^2 - \bar{U}^2},$$

Statistics last $$Y^* = aX^b = [antiln(\bar{V} - b\bar{U})] * X^{\left(\frac{\frac{1}{n}\sum_{i=1}^{n} UV - \bar{U}\bar{V}}{\frac{1}{n}\sum_{i=1}^{n} U^2 - \bar{U}^2}\right)},$$

Software



THANKS

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