Why Feature Scaling?

Ans- **Features have two things**- a) Magnitude. B) Units

Height:- Magnitude=(180,170), Units= cm
Weight :- Magnitude=(78, 84), Units= kg

KNN works on Euclidean distance and plotting such high values on plot is a vague thing, therefore we required scaling of features. Scaling needs to be done with respect to specific feature.

Algorithms required Scaling:-

1. **Linear Regression:-** convergence happens quickly after scaling(convergence to Global Minima)
2. **K-Means(Unsupervised):-** As we use Euclidean distance to have less scale of values and also runs fast
3. **KNN**:- As we use Euclidean distance to have less scale of values and also runs fast
4. **All alg**orithm have gradient descent concept, deep learning also, also which uses Euclidean distance
5. **CNN** (inputs are images):- Unit Scaling- pixels between 0 to 255 converted to between 0 and 1.

Algorithms don't require Feature Scaling:-

1. **Decision Trees -** After scaling also, no. of branches will not reduce.
2. **Random Forests -** Similarly, it is also ensemble method and uses Decision Trees for Construction
3. **XGBoost**
4. **Ensemble Methods**