Report di analisi

Sono stati creati tre dataset (ciascuno dei quali diviso in 80% per il training e 20% per il testing):

1. Dataset con le feature della frase
2. Dataset con l'embedding delle frasi
3. Dataset con le feature e l'embedding delle frasi

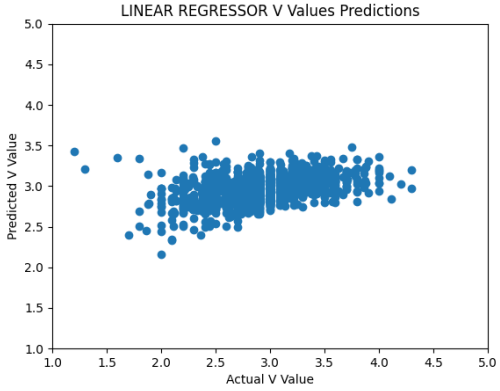
Per ognuno di questi sono state analizzate le performance di alcuni modelli di regressione (Linear, Random Forest e Gradient Boosting) utilizzati per predirre i valori V, A, D.

1. Dataset con le feature della frase

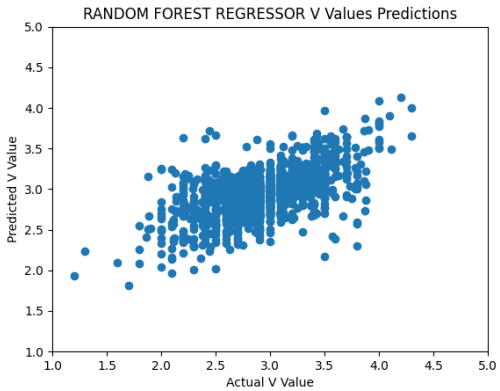
Di seguito, le metriche ottenute dalle predizioni dei valori V, A, D dei modelli di regressione Linear, Random Forest e Gradient Boosting addestrati sul dataset contenente l'encoding dell'emozione, le dimensioni A, D e le feature delle frasi:

- ## Valence

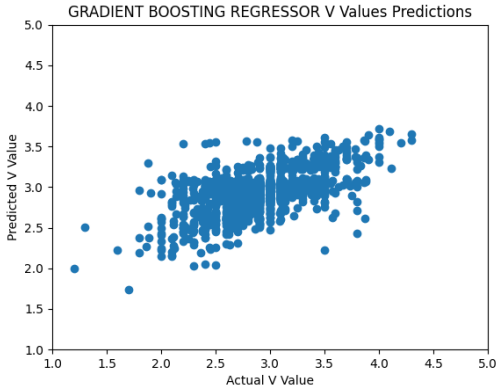
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.23206861067831516
Mean Squared Error (MSE): 0.1046109991568542
Root Mean Squared Error (RMSE): 0.3234362366168241
R^2: 0.14913207580493537



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.20246897195819738
Mean Squared Error (MSE): 0.08305877467893116
Root Mean Squared Error (RMSE): 0.2881991927104085
R^2: 0.32443005260582813

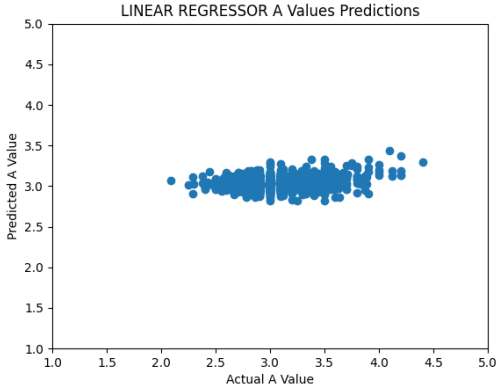


GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.19997520705668495
Mean Squared Error (MSE): 0.07865752411190896
Root Mean Squared Error (RMSE): 0.2804594874699534
R^2: 0.3602282283617966

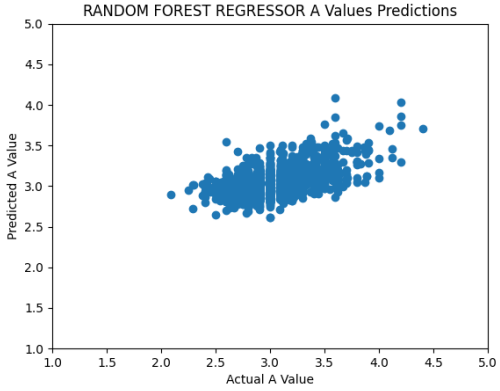


- ## Arousal

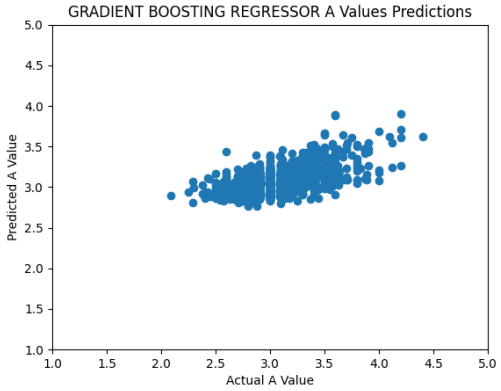
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.18961689446946448
Mean Squared Error (MSE): 0.06356948704806066
Root Mean Squared Error (RMSE): 0.25212990113840256
R^2: 0.07478418045086366



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.16986956859523025
Mean Squared Error (MSE): 0.04903015439903892
Root Mean Squared Error (RMSE): 0.22142753758066977
R^2: 0.2863954612276298

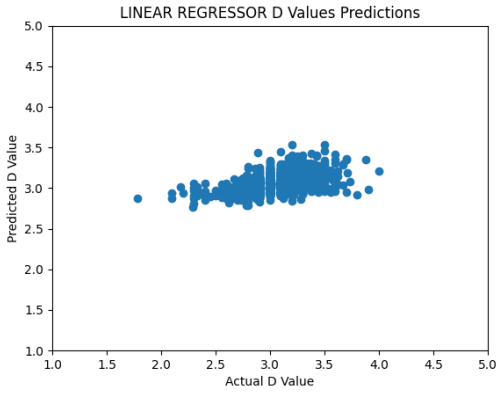


GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.1615443504264046
Mean Squared Error (MSE): 0.04533628408885673
Root Mean Squared Error (RMSE): 0.21292318823664258
R^2: 0.34015753175935515

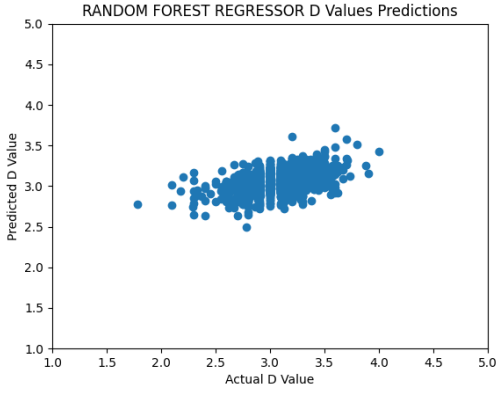


- **Dominance**

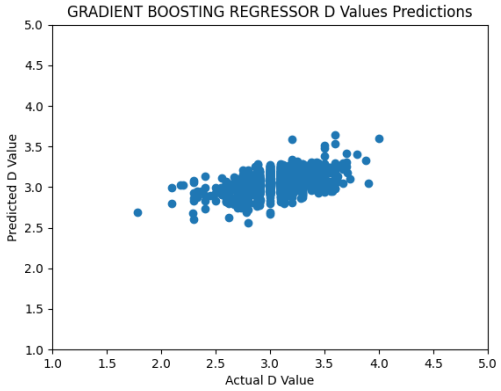
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.1392052809295413
Mean Squared Error (MSE): 0.035283994983582534
Root Mean Squared Error (RMSE): 0.18784034439806196
R^2: 0.19955215553728578



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.1405024677259186
Mean Squared Error (MSE): 0.03535261926690389
Root Mean Squared Error (RMSE): 0.18802292218478014
R^2: 0.19799535450928607



GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.1615443504264046
Mean Squared Error (MSE): 0.04533628408885673
Root Mean Squared Error (RMSE): 0.21292318823664258
R^2: 0.34015753175935515

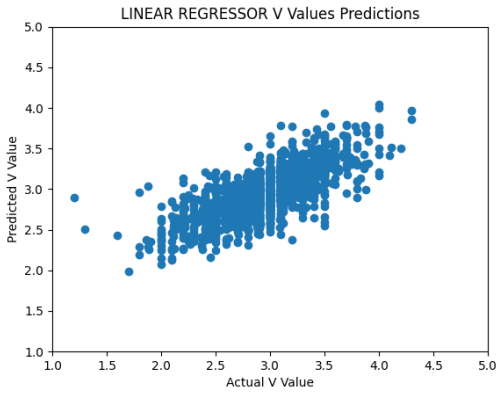


2. Dataset con l'embedding delle frasi

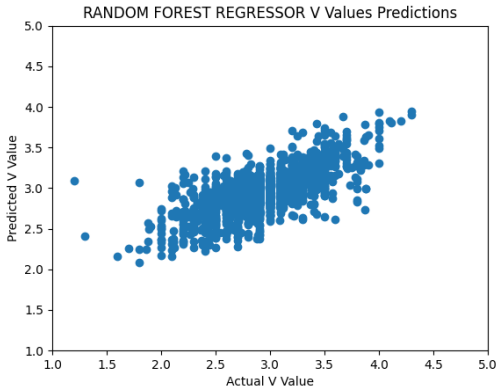
Di seguito, le metriche ottenute dalle predizioni dei valori V, A, D dei modelli di regressione Linear, Random Forest e Gradient Boosting addestrati sul dataset contenente l'encoding dell'emozione, le dimensioni A, D e l'embedding delle frasi:

- ## Valence

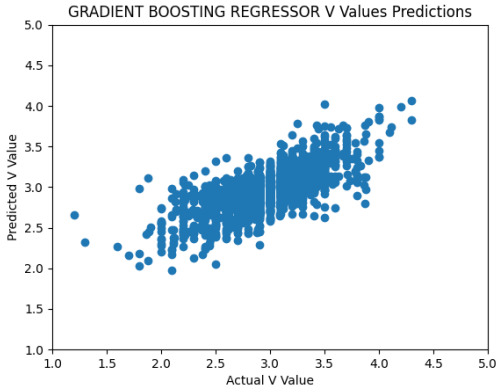
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.17994883497224234
Mean Squared Error (MSE): 0.05911930602644773
Root Mean Squared Error (RMSE): 0.24314461957124966
R^2: 0.5191450076568696



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.17795349222111886
Mean Squared Error (MSE): 0.06234062845746442
Root Mean Squared Error (RMSE): 0.24968105346113953
R^2: 0.4929439393931737

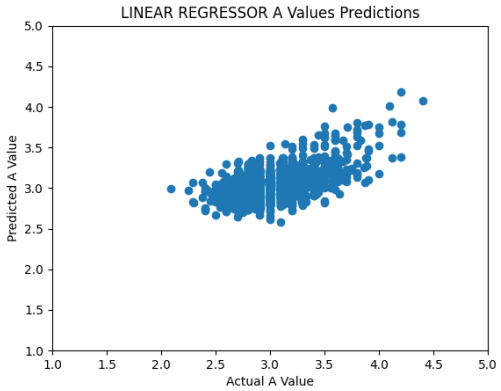


GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.17665499559246653
Mean Squared Error (MSE): 0.05903367560889545
Root Mean Squared Error (RMSE): 0.24296846628502114
R^2: 0.5198414944146474

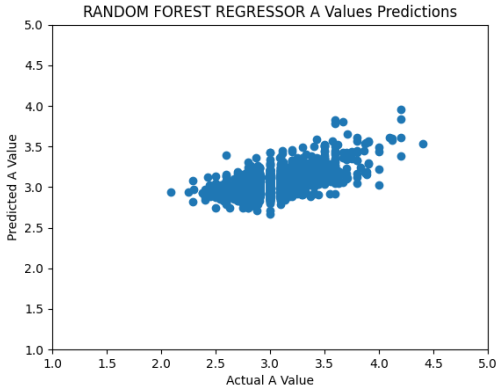


- **Arousal**

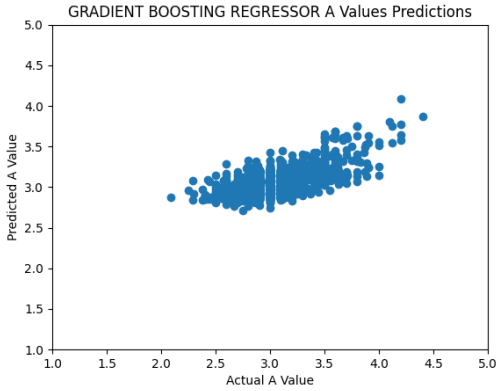
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.17050541429271918
Mean Squared Error (MSE): 0.048371224917990556
Root Mean Squared Error (RMSE): 0.21993459236325366
R^2: 0.29598578526740593



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.1590289946564525
Mean Squared Error (MSE): 0.04357181385709752
Root Mean Squared Error (RMSE): 0.2087386256951442
R^2: 0.36583833944485555

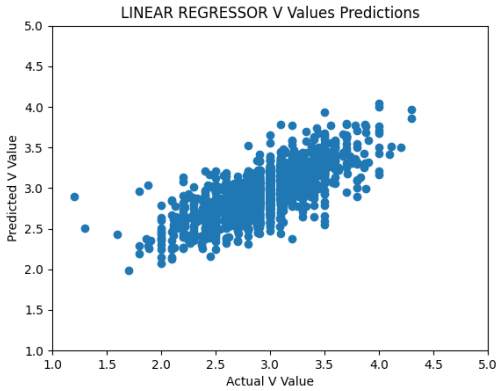


GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.15582117461767503
Mean Squared Error (MSE): 0.04106488014311282
Root Mean Squared Error (RMSE): 0.20264471407641704
R^2: 0.4023252585383844

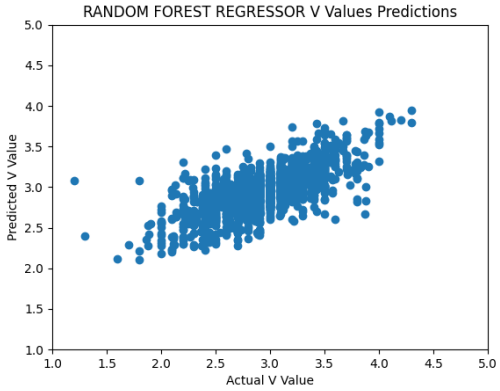


- ## Dominance

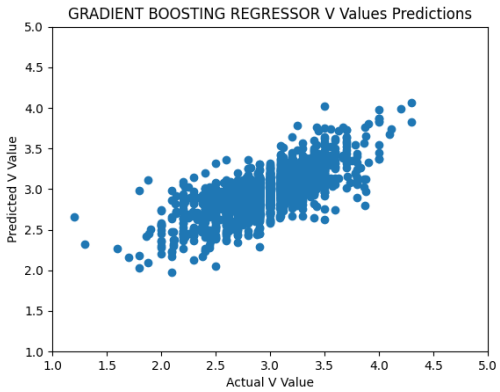
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.17994883497224234
Mean Squared Error (MSE): 0.05911930602644773
Root Mean Squared Error (RMSE): 0.24314461957124966
R^2: 0.5191450076568696



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.1778880503144654
Mean Squared Error (MSE): 0.062465722922873224
Root Mean Squared Error (RMSE): 0.24993143644382398
R^2: 0.49192646638394366



GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.17665291411676748
Mean Squared Error (MSE): 0.059033988786268185
Root Mean Squared Error (RMSE): 0.24296911076568597
R^2: 0.5198389471434888

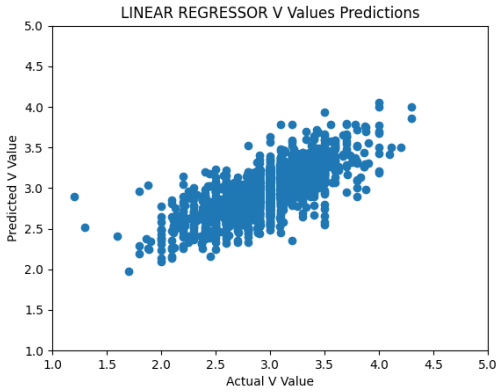


2. Dataset con le feature e l'embedding delle frasi

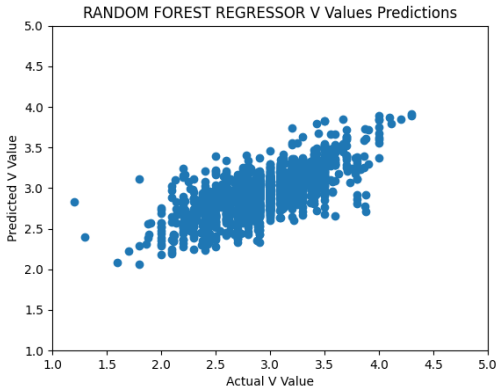
Di seguito, le metriche ottenute dalle predizioni dei valori V, A, D dei modelli di regressione Linear, Random Forest e Gradient Boosting addestrati sul dataset contenente l'encoding dell'emozione, le dimensioni A, D, le feature e l'embedding delle frasi:

- ## Valence

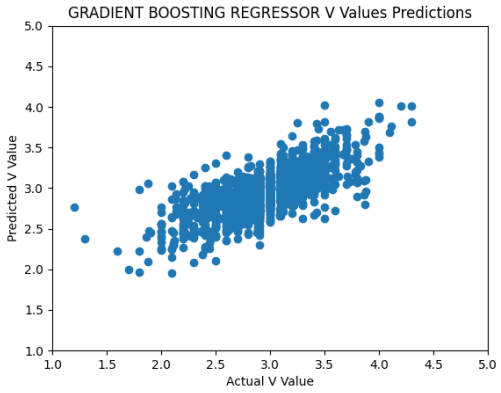
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.18092736621519268
Mean Squared Error (MSE): 0.059611516263669465
Root Mean Squared Error (RMSE): 0.2441546974024245
R^2: 0.5151415481144896



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.1796016787251147
Mean Squared Error (MSE): 0.06327626307532082
Root Mean Squared Error (RMSE): 0.2515477351822529
R^2: 0.4853338267710121

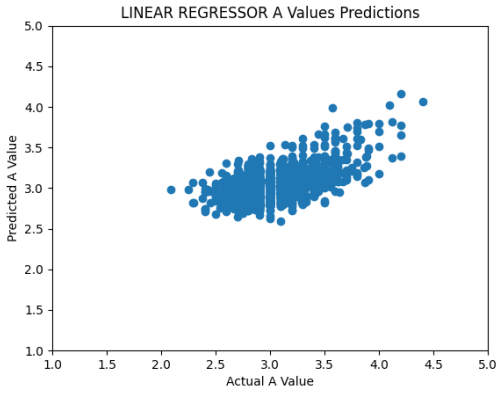


GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.17615152586923183
Mean Squared Error (MSE): 0.05922424284673725
Root Mean Squared Error (RMSE): 0.24336031485584755
R^2: 0.5182914896217584

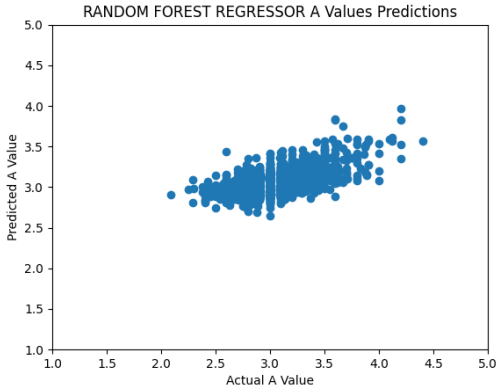


- **Arousal**

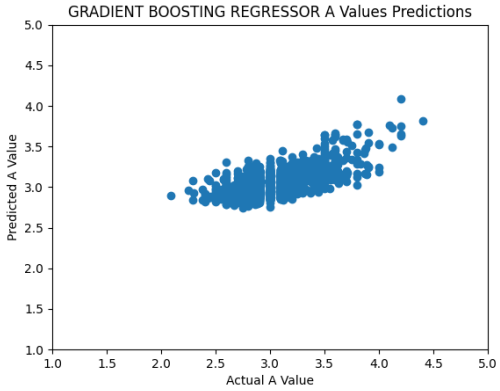
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.17054580914805398
Mean Squared Error (MSE): 0.04837929683090907
Root Mean Squared Error (RMSE): 0.21995294231018842
R^2: 0.2958683034082148



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.15961035905408175
Mean Squared Error (MSE): 0.04366539800472087
Root Mean Squared Error (RMSE): 0.20896267131887664
R^2: 0.36447627821295225

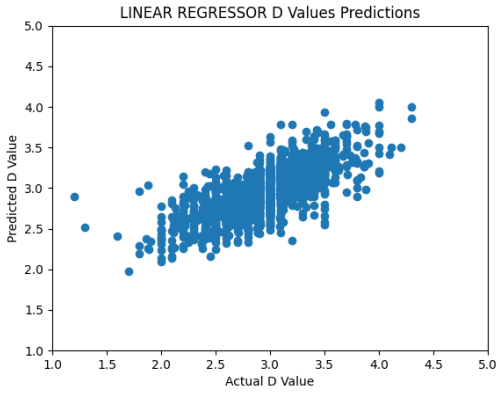


GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.15578277347216507
Mean Squared Error (MSE): 0.04110526754237497
Root Mean Squared Error (RMSE): 0.20274434034609937
R^2: 0.40173744412547996

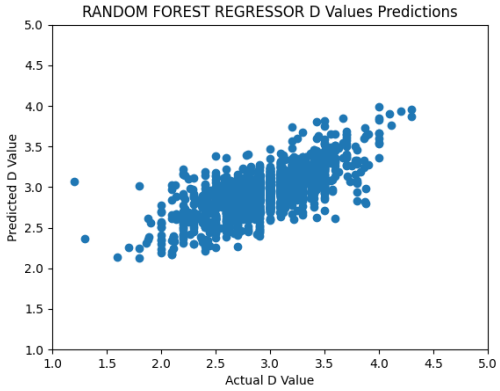


- **Dominance**

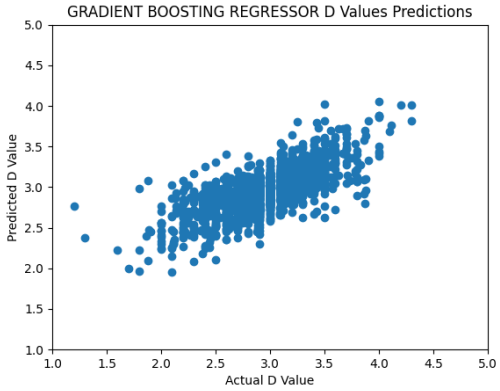
LINEAR REGRESSOR
Mean Absolute Error (MAE): 0.18092736621519268
Mean Squared Error (MSE): 0.059611516263669465
Root Mean Squared Error (RMSE): 0.2441546974024245
R^2: 0.5151415481144896



RANDOM FOREST REGRESSOR
Mean Absolute Error (MAE): 0.1777807372204095
Mean Squared Error (MSE): 0.0623745106194169
Root Mean Squared Error (RMSE): 0.24974889513152385
R^2: 0.49266835417708643



GRADIENT BOOSTING REGRESSOR
Mean Absolute Error (MAE): 0.17620046104121792
Mean Squared Error (MSE): 0.059272482855059164
Root Mean Squared Error (RMSE): 0.24345940699644195
R^2: 0.5178991228909668



- Summary dei risultati

Per la predizione dei valori di Valence e di Arousal, i risultati migliori (tenendo particolare attenzione all'RMSE) sono stati ottenuti dai dataset contenenti l'embedding delle frasi e le feature delle frasi (dataset 2 e 3). Per entrambi i dataset si sono ottenuti valori molto simili di RMSE con tutti e tre i modelli utilizzati. Per i valori di Dominance, i risultati migliori sono stati ottenuti utilizzando i modelli di linear regression e random forest sul dataset contenente solo le feature delle frasi. Di seguito una rapida tabella ricapitolativa dove vengono mostrati solamente i valori della metrica RMSE per ogni dataset e modello utilizzato:

Dataset con le feature della frase	
Valence	
	LINEAR REGRESSOR: (RMSE): 0.3234362366168241
	RANDOM FOREST REGRESSOR (RMSE): 0.2881991927104085
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.2804594874699534
Arousal	
	LINEAR REGRESSOR: (RMSE): 0.25212990113840256
	RANDOM FOREST REGRESSOR (RMSE): 0.22142753758066977
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.21292318823664258
Dominance	
	LINEAR REGRESSOR: (RMSE): 0.18784034439806196
	RANDOM FOREST REGRESSOR (RMSE): 0.18802292218478014
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.21292318823664258
Dataset con l'embedding delle frasi	
Valence	
	LINEAR REGRESSOR: (RMSE): 0.24314461957124966
	RANDOM FOREST REGRESSOR (RMSE): 0.24968105346113953
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.24296846628502114
Arousal	
	LINEAR REGRESSOR: (RMSE): 0.21993459236325366
	RANDOM FOREST REGRESSOR (RMSE): 0.2087386256951442
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.20264471407641704
Dominance	
	LINEAR REGRESSOR: (RMSE): 0.24314461957124966
	RANDOM FOREST REGRESSOR (RMSE): 0.24993143644382398
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.24296911076568597
Dataset con le feature della frase e l'embedding delle frasi	
Valence	
	LINEAR REGRESSOR: (RMSE): 0.2441546974024245
	RANDOM FOREST REGRESSOR (RMSE): 0.2515477351822529
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.24336031485584755
Arousal	
	LINEAR REGRESSOR: (RMSE): 0.21995294231018842
	RANDOM FOREST REGRESSOR (RMSE): 0.20896267131887664
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.20274434034609937
Dominance	
	LINEAR REGRESSOR: (RMSE): 0.2441546974024245
	RANDOM FOREST REGRESSOR (RMSE): 0.24974889513152385
	GRADIENT BOOSTING REGRESSOR (RMSE): 0.24345940699644195