



**IIT Madras**  
ONLINE DEGREE

# Statistics for Data Science -1

## Lecture 4.5: Association between two numerical variables-Describing association

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## Describing association

When describing association between variables in a scatter plot, there are four key questions<sup>1</sup> that need to be answered

1. **Direction:** Does the pattern trend up, down, or both?
2. **Curvature:** Does the pattern appear to be linear or does it curve?
3. **Variation:** Are the points tightly clustered along the pattern?
4. **Outliers:** Did you find something unexpected?

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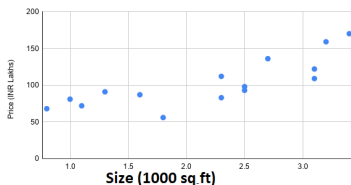
<sup>1</sup>Stine, Robert, and Dean Foster. Statistics for Business: Decision Making and. Addison-Wesley, 2011.

## Describing association: Direction

Does the pattern trend up, down, or both?

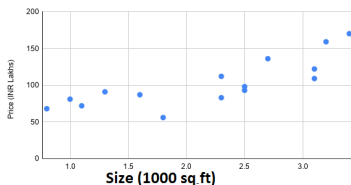
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## Describing association: Direction

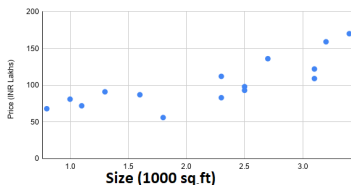
Does the pattern trend up, down, or both?



Up

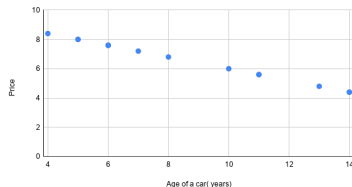
## Describing association: Direction

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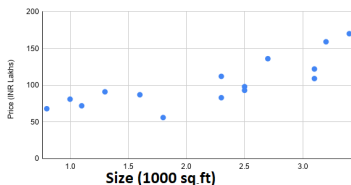
Up

Price vs. Age of a car( years)



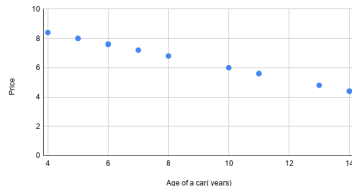
## Describing association: Direction

Does the pattern trend up, down, or both?



Up

Price vs. Age of a car( years)

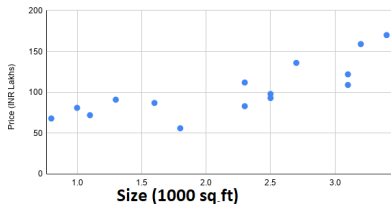


Down

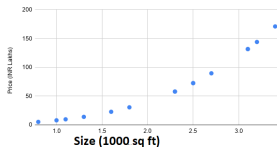
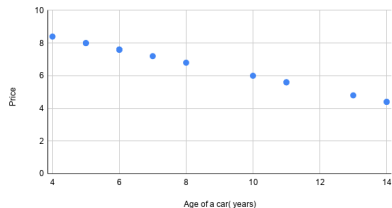


## Describing association: Curvature

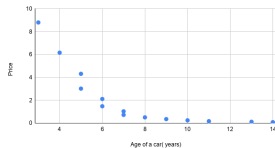
Does the pattern appear to be linear or does it curve?



Price vs. Age of a car( years)

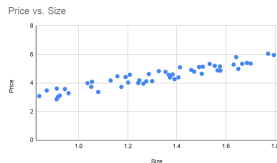


Price vs. Age of a car( years)



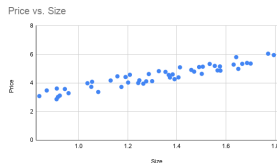
## Describing association: Variation

Are the points tightly clustered along the pattern?



## Describing association: Variation

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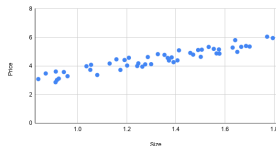


Tightly clustered

## Describing association: Variation

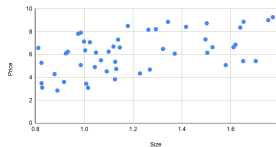
Are the points tightly clustered along the pattern?

Price vs. Size



Tightly clustered

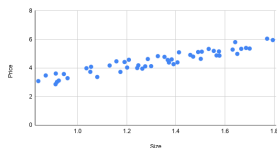
Price vs. Size



## Describing association: Variation

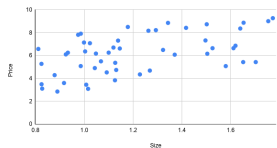
Are the points tightly clustered along the pattern?

Price vs. Size



Tightly clustered

Price vs. Size

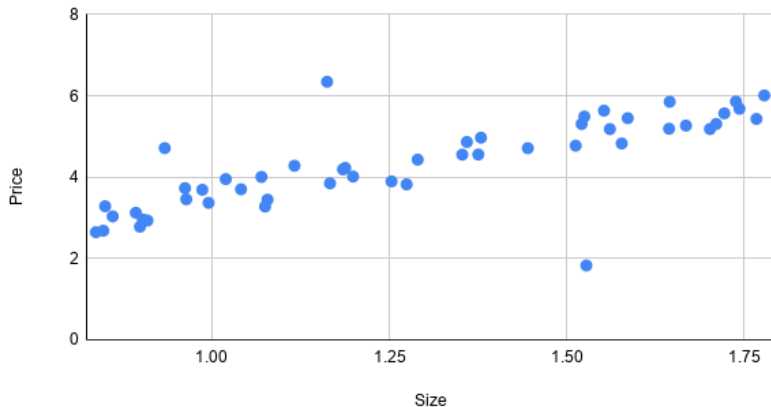


Variable

## Describing association: Outliers

Did you find something unexpected?

Price vs. Size



## Section summary

### Describing association

1. Direction
2. Curvature
3. Variation
4. Outliers.