Exploratory Data Analysis

MKT 566

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Before we start

- Groups
- Homework

What we will learn

How to use visualization to explore your data in a systematic way (also called **Exploratory Data Analysis** or **EDA**)

- Generate questions about your data
- Search for answers by visualizing, transforming, and modelling your data
- Use what you learn to refine your questions and/or generate new questions.

(Partially based on Chapter 7 of R for Data Science)

EDA Goal

- There is no rule about which questions you should ask to guide your research.
- However, two types of questions will always be useful for making discoveries within your data. You can loosely word these questions as:
  - What type of **variation** occurs within my variables?
  - What type of **covariation** occurs between my variables?

Covariation

- **Covariation** is the tendency for the values of two or more variables to vary together in a related way
- The best way to spot covariation is to **visualize the relationship between two or more variables**
- How you do that should again depend on the type of variables involved

Visualizing covariation

Example with the marketing dataset from the library ‘datarium’

```
> head(marketing)
  youtube facebook newspaper sales
1  276.12    45.36     83.04 26.52
2   53.40    47.16     54.12 12.48
3   20.64    55.08     83.16 11.16
4  181.80    49.56     70.20 22.20
5  216.96    12.96     70.08 15.48
6   10.44    58.68     90.00  8.64
```

A categorical and continuous variable

How can we visualize sales by ad spend?

Two continuous variables

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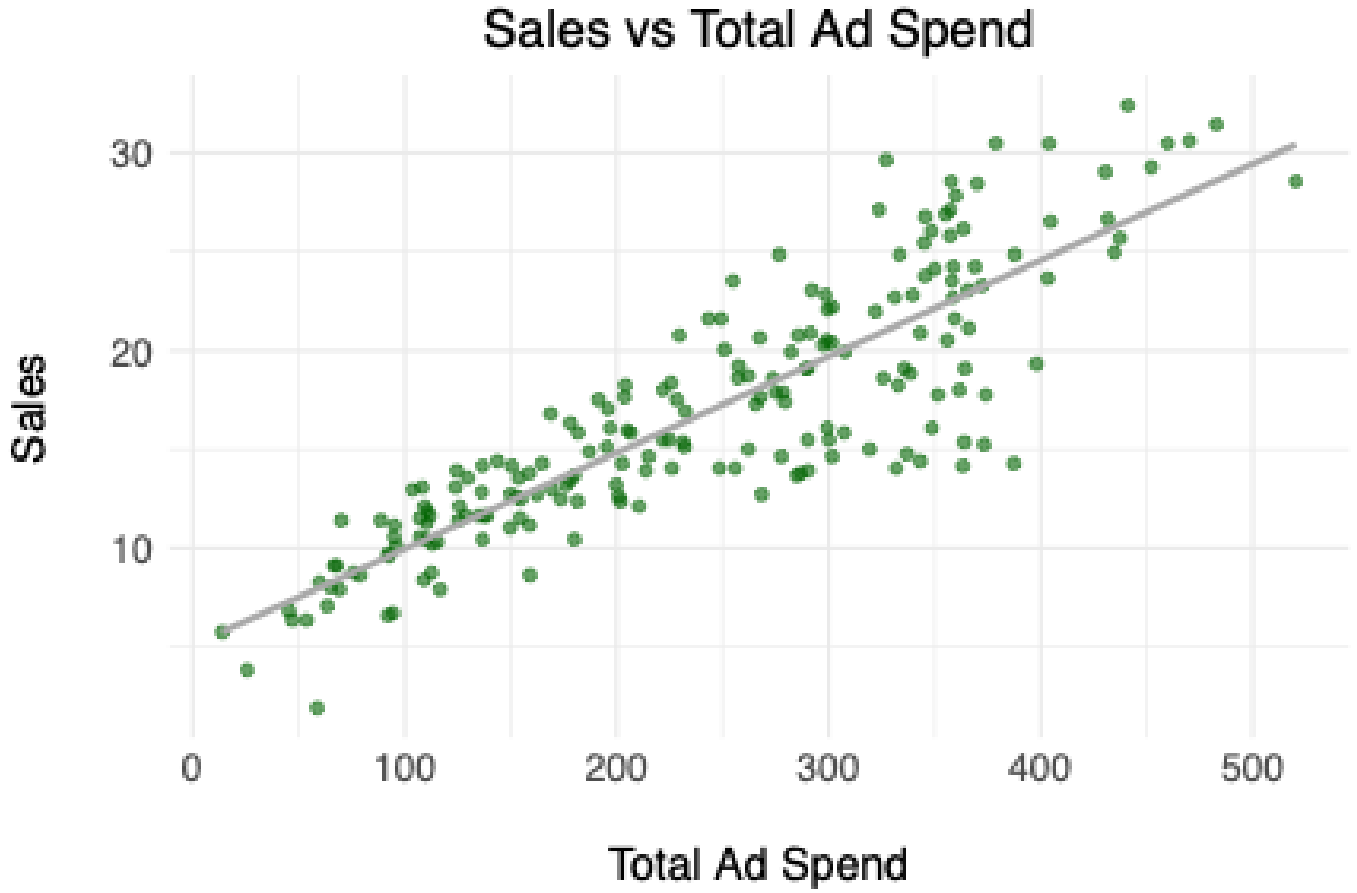
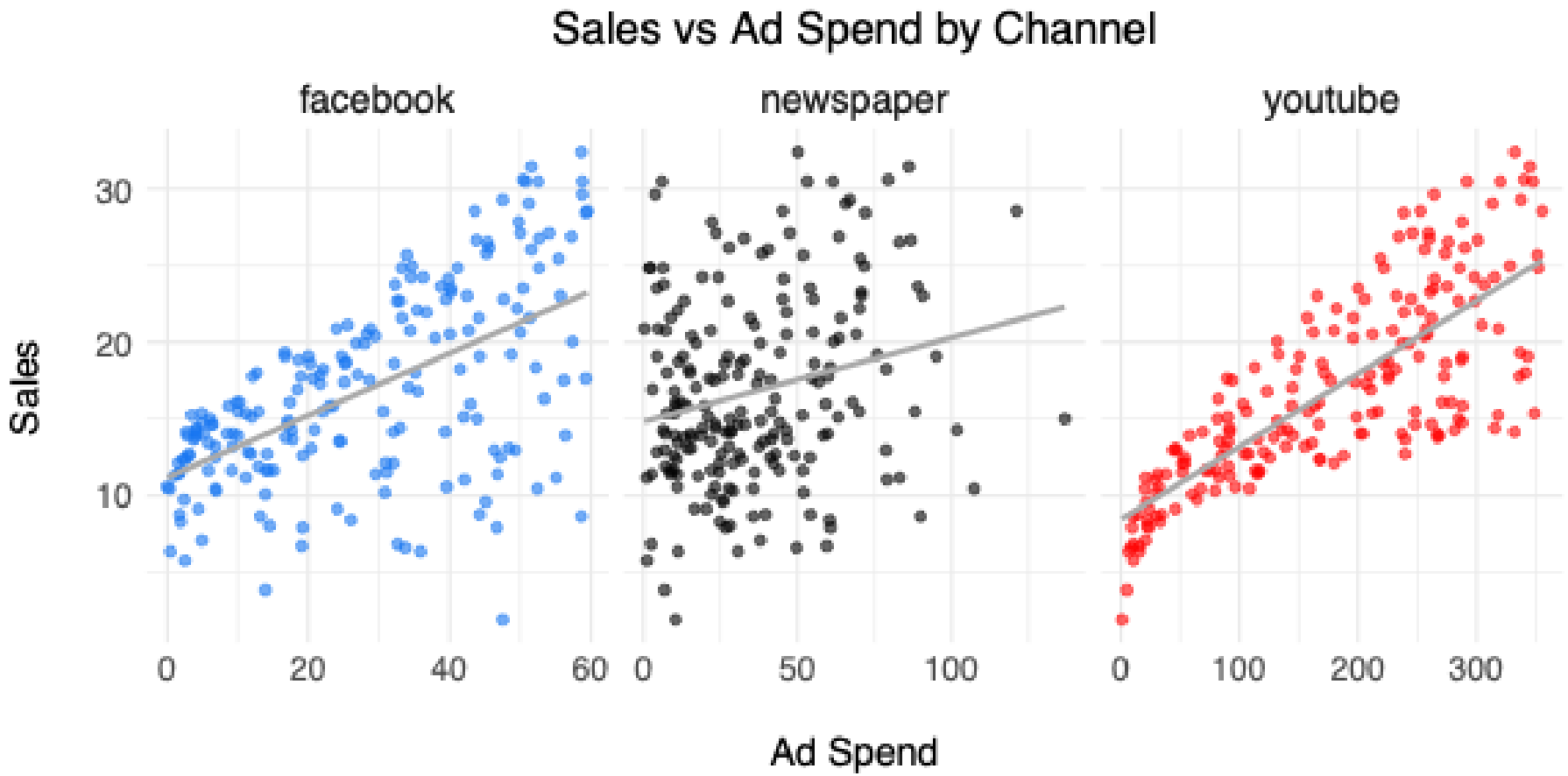


Two continuous variables

Can we do a more informative viz?

Two continuous variables

Can we do a more informative viz?



One categorical and one continuous variable

Let’s use the simulated marketing dataset we explored last week

```
> head(df)
   CustomerID   Age Gender  Device Channel Ad_Spend Clicks Purchases Revenue
        <int> <int> <char>  <char>  <char>    <num>  <int>     <int>   <num>
1:          1    54      M  Mobile  Social   718.60     95         6  149.16
2:          2    18      F  Mobile  Search   233.00     34         1   22.22
3:          3    42      F  Mobile  Search   122.51     18         0    0.00
4:          4    27      F Desktop  Social   198.78     19         1   13.22
5:          5    53      F  Mobile  Social   145.19     19         4  150.48
6:          6    35      M Desktop   Video   125.74      9         0    0.00
```

One categorical and one continuous variable

Which viz can we use to explore the relationship between purchases and gender?

One categorical and one continuous variable

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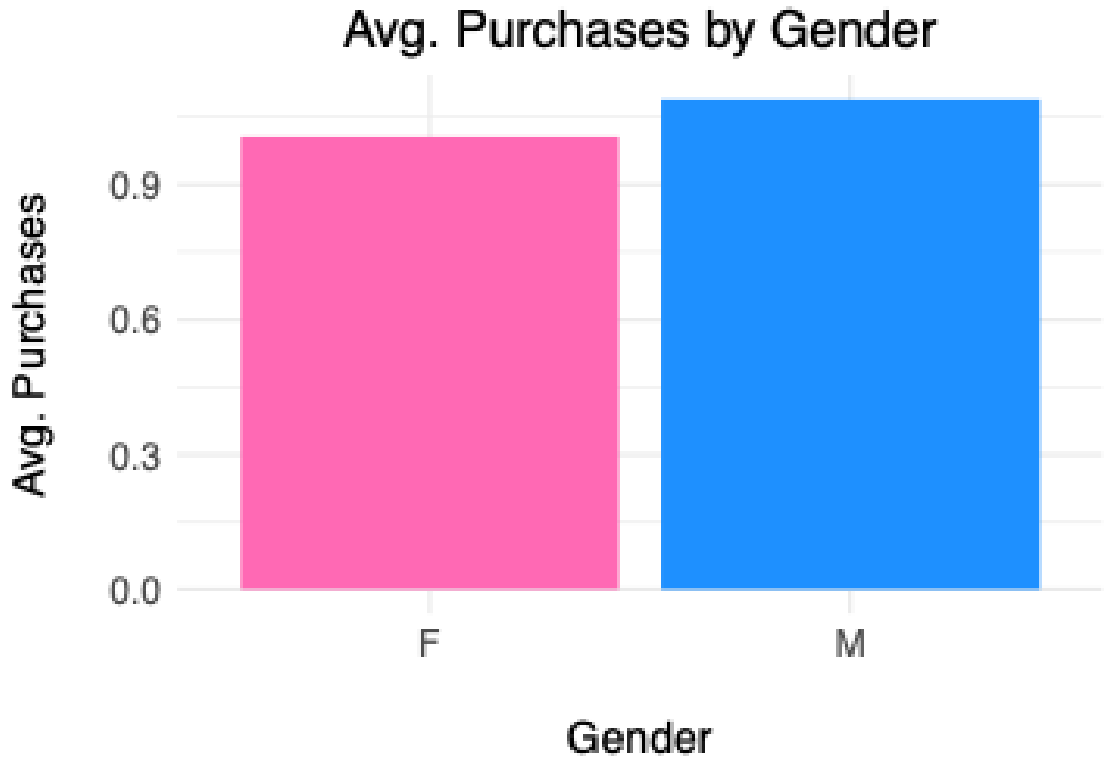
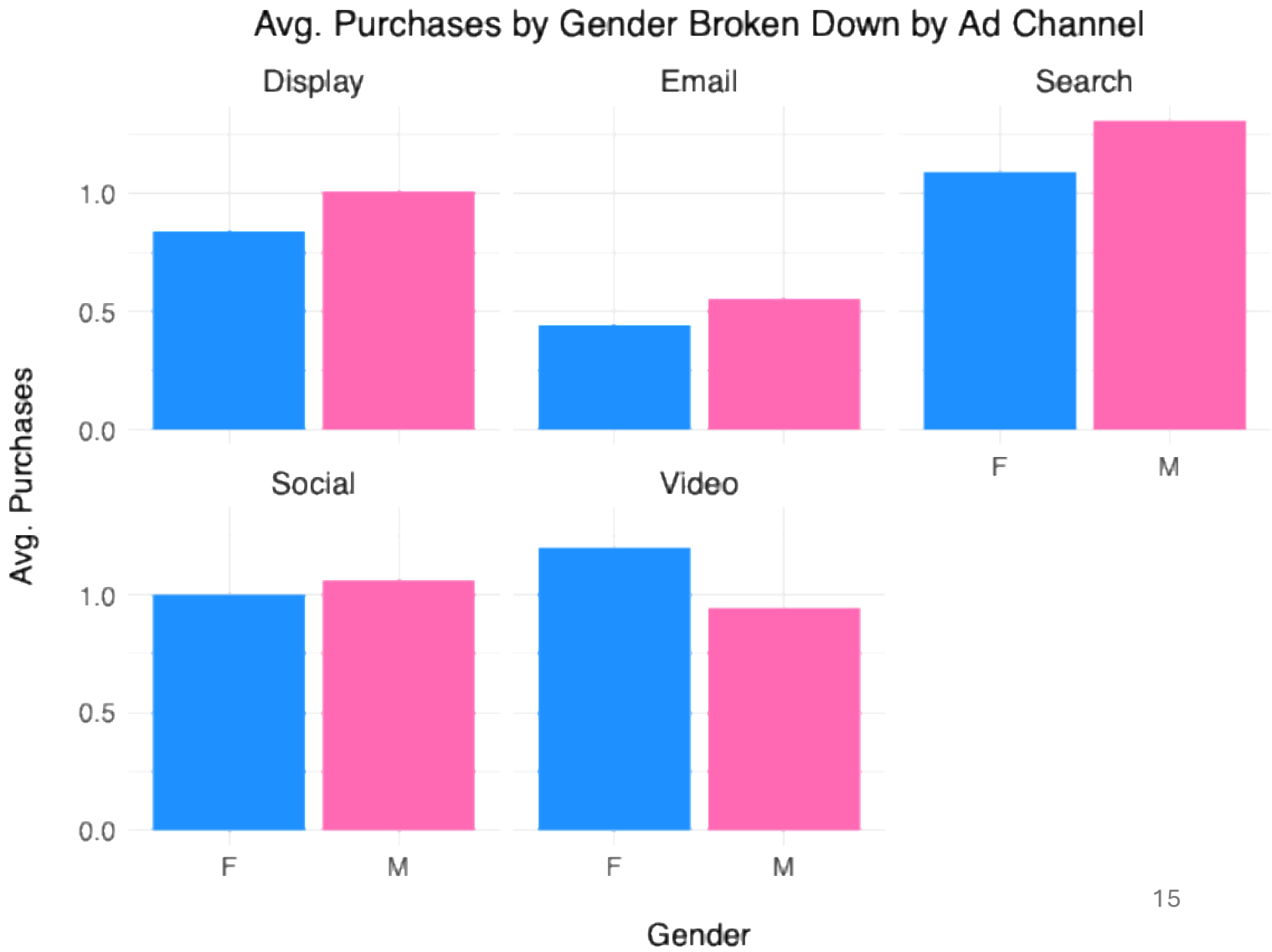


One categorical and one continuous variable

Let’s add an additional dimension: Ad Channel



RateBeer data viz exercise

Code:

- RateBeer case: html and R Markdown, dataset

```
> head(beer)
                                    beer_name beer_beerId beer_brewerId beer_ABV       beer_style review_appearance review_aroma review_palate review_taste review_overall review_time review_profileName
                                        <char>      <char>         <int>   <char>           <char>            <char>       <char>        <char>       <char>         <char>       <int>             <char>
1:                John Harvards Fancy Lawnmower Beer       64125          8481      5.4            Klsch               2/5         4/10          2/5         4/10           8/20  1157587200             hopdog
2: Barley Island Dirty &amp;quot;Old&amp;quot; Helen Sour Ale      114513          3228        - Sour Ale/Wild Ale               4/5         8/10          4/5         8/10          17/20  1266019200              MI2CA
3:  Barley Island Sinister Minister Belgian Black Ale       77833          3228      6.7   Traditional Ale               3/5         6/10          3/5         6/10          16/20  1237420800            emacgee
4:  Barley Island Sinister Minister Belgian Black Ale       77833          3228      6.7   Traditional Ale               4/5         6/10          4/5         6/10          14/20  1229040000          after4ever
5:  Barley Island Sinister Minister Belgian Black Ale       77833          3228      6.7   Traditional Ale               3/5         6/10          3/5         6/10          12/20  1222041600              Sparky
6:  Barley Island Sinister Minister Belgian Black Ale       77833          3228      6.7   Traditional Ale               3/5         5/10          3/5         6/10          13/20  1221264000             jsquire
```