INTRODUCTION TO PROBABILITY (PART OF CH 14-17)

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REC. 1-12-10 DUE AT END OF RECITATION TOMORROW.

WHAT IS STATISTICS?

EQ. NEWSPAPER: "POLLS REPORTS EST. 90% OF VOTERS VOTING REPUB IS 61%.

MARGIN OF ERROR = 1.3%"

IF EVERY ONE OF THE ASSUMPTIONS BEIND THE
METHOD IS CORRECT

SAMPLE FRACTION = MARGIN OF ERROR
For our data:

\[ 61 \pm 1.3 \]

61 - 1.3 to 61 + 1.3

This HIID or

\[ p = \text{REP} \]

in population

CH. 14. CLASSICAL PROBABILITY MODEL.

Equally likely outcomes

\[ R \in \{1, 2, 3, 4, 5, 6\} \]

36 possible outcomes

\[ P(R = 3) = \frac{\text{favorable}}{\text{total}} = \frac{6}{36} = \frac{1}{6} \]

\[ P(R + G = 5) = \frac{4}{36} \]

\[ P(R + G \neq 5) = 1 - \frac{4}{36} = \frac{32}{36} \]

\[ (R + G = 5) \quad 15 \quad (R + G \neq 5) \]
\[ P(R > G) = \frac{15}{36}. \]

**Venn Diagram**

- \( P(A) = \frac{1}{3} \)
- \( P(B) = \frac{1}{3} \)
- \( P(A^c \cap B^c) = \frac{1}{3} \)
- \( A = \text{JACK's 5} \)
- \( B = \text{JILL's 5} \)
- \( \text{Universe of possible outcomes} \)
- \( \text{Sample space} \)

**Example:**

JACK + JILL

\[ P(\text{JILL'S}) = \frac{2}{6} = \frac{1}{3} \]

Same as JACK.

\[ P(\text{JILL'S}) = \frac{2}{6} = \frac{1}{3} \]

CH.15

\[ P(\text{JILL'S}) = P(\text{JACK's 1 and JILL's 5}) \]

\[ P(\text{JACK's 1}) = \frac{1}{3} \]

\[ P(\text{JILL's 5} \mid \text{JACK's 1}) = \frac{1}{2} \]
### Table

<table>
<thead>
<tr>
<th>Gene Type</th>
<th>Left</th>
<th>Right</th>
<th>Marginal Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>60</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Aa</td>
<td>30</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>aa</td>
<td>15</td>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>105</td>
<td>100</td>
<td>205</td>
</tr>
</tbody>
</table>

**Marginal**

- Corrected: \( \frac{60}{120} \) for \( R \)

**Independent Events?**

Events A, B are independent if P(A) for B is not changed upon learning whether or not A happened.

<table>
<thead>
<tr>
<th>Smoker</th>
<th>Cancer</th>
<th>Not Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker</td>
<td>2000</td>
<td>10000</td>
</tr>
<tr>
<td>Not</td>
<td>200</td>
<td>10000</td>
</tr>
<tr>
<td></td>
<td>2200</td>
<td>110000</td>
</tr>
</tbody>
</table>

In smokers: \( \frac{2000}{10200} \) and in non-smokers: \( \frac{200}{10200} \)
DEF: A, B are statistically independent if \( P(A \text{ and } B) = P(A)P(B) \)

Example: Table above \( P(S+C) = \frac{2000}{110000} \)

\[ P(S) = \frac{102000}{110000} \]

\[ P(C) = \frac{2200}{110000} \]

\( \frac{P(\text{not } S \text{ and not } C)}{P(S) + P(C) - P(S \text{ and } C)} \)