More Applications of Survival Analysis

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Key Reference: *Collett, D. (2023). Modelling survival data in medical research (4th ed.). CRC Press.*

Survival Analysis in Engineering

Importance of Repair Time: Critical for maintaining customer loyalty.

Definition: Time from problem report to item functioning again.

Censoring: Some items may be unrepairable, causing missing repair times.

Key Factors:

- Age of the item
- Extent of usage
- Level of care and maintenance

Goal: Analyze factors affecting repair time to improve service efficiency and customer satisfaction.

Survival Analysis in Finance

Mortgage Application Processing: Time from submission to approval.

Censoring:

- Applications may withdraw (e.g., sale falls through, other funding found).
- Withdrawals often linked to long processing times.

Loan Repayment:

- Time taken by companies to repay loans yields survival data.
- Defaults lead to censored observations.

Key Factors Affecting Time to Repayment:

- Company size
- Company age
- Loan amount

Goal: Optimize mortgage processing and loan repayment strategies by analyzing key factors.

Survival Analysis in Marketing

Customer Churn: Percentage of customers leaving a company in a given period.

Importance: Retaining customers is often cheaper than acquiring new ones.

Applications:

- Time to customer leaving
- Time to service cancellation
- Time to product upgrade (e.g., iPhone, computer)
- Duration of a subscription (e.g., software, iCloud)

Reasons for Leaving:

- Poor customer service
- Inferior product quality
- High cost

Factors Influencing Retention:

- Referral acquisition
- Customer service interaction time
- Availability of introductory offers

Goal: Identify key factors driving customer retention to improve loyalty and reduce churn.

Survival Analysis in Insurance

Applications:

- Time to claim settlement after reporting a loss.
- Time until a policyholder lapses or cancels a policy.
- Time until a policyholder files the first claim.

Censoring:

- Some policies remain active with no claim or cancellation during the observation period.

Factors Influencing Events:

- Policyholder age
- Type and size of coverage
- Claim history
- Premium cost

Goal: Improve risk assessment, pricing strategies, and customer retention.

Survival Analysis in Business

Applications:

- Time until a startup fails or exits the market.
- Time until a product is discontinued.
- Time to employee turnover (resignation or termination).

Censoring:

- Businesses or products still active at the end of the study.

Factors Influencing Outcomes:

- Market conditions
- Company size and resources
- Leadership changes
- Competitive pressures

Goal: Predict risks, plan strategies, and improve long-term business success.

Survival Analysis in Medical Studies

Applications:

- Time from treatment to recovery, relapse, or death.
- Time until disease progression.
- Time to hospital readmission.

Censoring:

- Patients lost to follow-up or still alive without the event by study end.

Factors Influencing Outcomes:

- Patient age and gender
- Type of treatment
- Disease severity
- Lifestyle factors (e.g., smoking, exercise)

Goal: Improve treatment effectiveness and patient care strategies.

Survival Analysis in Psychology

Applications:

- Time from end of psychotherapy to significant behavioral change.
- Time to remission from problem behaviors (e.g., alcohol abuse).

Factors Influencing Remission:

- Family history of alcohol dependence
- Socioeconomic status
- Personality traits
- Employment stability
- Influence of peers' smoking and drinking habits

Goal: Identify key factors to better manage and support patient recovery.

Thank You!