PROBABILITY AND STATISTICS IN ENGINEERING

MACUROVÁ Anna – MACURA Dušan, SR

Resumé

This paper has been writen a some cours in applied probability and statistics for undegraduate students in engineering. The industry has realized that it must dramatically improve the quality of its products and services if it to compete effectivelly both in domestics and world markets.

Klíčová slova: statistika, pravděpodobnost, hypotézy.

PRAVDĚPODOBNOST A STATISTIKA V INŽENÝRSTVÍ

Abstract

V příspěvku jsou uvedený některé možnosti aplikací kapitoly pravděpodobnosti a statistiky potřebné pro studenty inženýrských fakult. Průmysl by řešil kvalitu produkce a servis produktů efektivněji s využitím statistických metod.

Key words: statistics, probability, hypotheses.

Introduction

The importace of statistics in engineering has been underscored by the involvement of industry in quality improvement. A successful quality – improvement program can reduce scrap and rework, reduce satisfaction. Statistics is a critical skill, because statistical techniques can be used to descirbe variability.

Virtually real- world proceses exhibit variability. Consider situations where we select several castings from a manufacturing process and measure a critical dimnesion on each part. If the measuring instrument has sufficient resolution, the vane openings will be different. If we count then umber of defects on printed circuit boards, we will find variability in the counts. Variability is the reset of chase in the conditions under which observations are made. In this we will present some techniques for dealing with both measurment and atribute date.

1 Descriptive statistics

The branch of statistics that deals with organization, summarization and presentation. Some of the techniques of descriptive statistics have been in use for over 200 yers. Modern computer technology, particulary computer graphics has greatly expanded the field of descriptive statistics.

2 Testing hypothese -example

Research machined surfaces is a fundamental problem whose solution improves the theory of production technologies. Research machined surfaces is a fundamental problem whose solution improves the theory of production technologies. In the next experiment, a particular focus on the statistical analysis of selected data in terms of extreme values in a set of experimental values obtained. Roughness of the machined surface can be regarded as a random variable with normal distribution. Let $x_1, x_2, \ldots, x_8$ are the random sample from the normal distribution

$$4{,}8 \quad 7{,}3 \quad 5{,}4 \quad 6{,}2 \quad 7{,}1 \quad 5{,}1 \quad 9{,}8 \tag{1}$$

machined surface roughness values (turning in microns). Value 9,8 aroused suspicion that it is extremely large.

Testing the hypothesis

Test this hypothesis at the significance level $\alpha = 0,05$.

$H_0 : x_{max} = 9,8$ not is an extremely large value

Against

$H_1 : x_{max} = 9,8$ is an extremely large value   (2)

The set of values (1) under value, to the following test statistics $n = 8$, $x_{max} = 9,8$, $\overline{x} = 6,4375$, $s_x = 1,6256$ to the following test statistics

$$T_{max} = \frac{x_{max} - \overline{x}}{s_x} \sqrt{\frac{n}{n-1}} \; .$$ (3)

After calculation we get $T_{max} = 2,2112$.

If $\; T_{max} > T_\alpha(n)$,   (4)

to reject x_{max} an extremely large value, the critical value $T_\alpha(n)$ for the Grubbs test, which can be determined from statistical tables [1] $\alpha = 0,05$ je $\; T_{0,05}(8) = 2,172$.

Based on relation (4) is $T_{0,05}(8) = 2,172 < T_{max} = 2,2112$.

The value of 9,8 is extremely high and it can be a set of (1) excluded.

Conclusion

The importace of statistics in engineering has been underscored by the involvement of industry in educational process. A successeful quality – improvement program can prepared to praktice. Statistics is a critical skill, because statistical techniques can be used to descirbe variability and testing hypothesis.

Literature

1. POTOCKÝ R. et all. *Zbierka úloh z pravdepodobnosti a matematickém štatistiky.* Bratislava: Alfa, 1991. 392 p.ISBN 80-05-00524-5.
2. HREHOVÁ S. *Some Satistics Metod in Technical Education.* Univerzita Palackého v Olomouci, 2009. ISBN 978-80-7220-316-1.

Lektoroval: Prof. RNDr. Anna Tirpáková, CSc

Kontaktní adresa:

Anna Macurová, doc. PaedDr. PhD.,
Katedra matematiky, informatiky a kybernetiky
FVT TU , Bayerova 1, 08001Prešov , SR, tel.
00421 7722605,
e-mail: anna.macurova@tuke.sk

Dušan Macura Mgr., PhD.,
Fakulta humanitných a prírodných a vied,
Prešovská univerzita, Ul 17. Novembra,08001
Prešov, SR ,e-mail: dusan.macura@unipo.sk