COSMIC Measurements Dispersion

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Topics

1. Motivation
2. Software Functional Size Measurement
3. COSMIC FFP
4. Data Gathering
5. Data Analysis
6. Concluding Remarks
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1. **Motivation**
2. Software Functional Size Measurement
3. **COSMIC FFP**
4. Data Gathering
5. Data Analysis
6. Concluding Remarks
1. Motivation

- Study of the error that is introduced together with the interpretation of the COSMIC unit application rules.

- Due to subjectivity and degrees of freedom, this error can lead to great measurement dispersions.

- Data analysis is obtained based upon a study performed at a University, together with a group of Master students.
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2. Software Functional Size Measurement

- Earliest SFSM methods → Source Lines of Code - SLOC

- Newest SFSM methods → Function Points – FP
  - NESMA v.2.1, Standard ISO/IEC 24570
  - MK II v.1.3.1, Standard ISO/IEC 20968
  - COSMIC v3.0. Standard ISO/IEC 19761
  - FISMA FPA v1.1 Standard ISO/IEC 29881
2. Software Functional Size Measurement

- SFSF Methods Timeline -
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3. COSMIC FFP

- Common Software Measurement International Consortium (COSMIC) was founded in 1998
  - Definition of the CFP unit in 1999.
  - Increase of the projects measured using COSMIC.

- COSMIC Features:
  - Wide scope of applicability; it can be used to measure very different kinds of software; real-time software.
  - Clearness of its concepts; it is easy to use and to learn.
  - Low cost of application.
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4. Data Gathering

- Data Gathering Problems:
  - Obtaining industry data on the dispersion of COSMIC unit is practically impossible.
  - Solution ➔ Create a laboratory environment for collecting measurement data of same software projects by different users.

- Data Gathering Procedure:
  1. Training COSMIC unit-based measurement
     - Students receive 10 hours of theoretical lectures
4. Data Gathering

- **Data Gathering Procedure:**
  
  2. **Student selection**
     - Attend at least 90% of the classes
     - Have a grade better than 7/10 in the written exam
  
  3. **Real-world application measurement**

- **Sample Generation:**
  
  - One academic year
  - Following previous steps → 61 students were selected to participate in the COSMIC measurement dispersion study.
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5. Data Analysis

- Definition of the COSMIC variables:
  - Entry (E)
  - Exit (X)
  - Read (R)
  - Write (W)

- Statistical Analysis of the Variables:
  - Variable W showed the highest difference with AV.
  - TFP features values more spread than other variable values.
  - Majority of measurements for TFP was close to its AV value of 38.
5. Data Analysis

Distribution of the sample for TFP

<table>
<thead>
<tr>
<th>N</th>
<th>61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z de Kolmogorov-Smirnov</td>
<td>0.69392633</td>
</tr>
<tr>
<td>Sig. asintot. (bilateral)</td>
<td>0.72132108</td>
</tr>
</tbody>
</table>

Kolmogorov-Smirnov Test
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- Dispersion of the COSMIC unit conforms to a normal distribution.
  - 95% of measurements values are located in an Interval of 60% around the AV.
  - Interval of 50% around the AV 90% of the measurements are located.
  - Large margin of error due to measurers with low experience.

- Variable W identified as the main source of error of dispersion.

- Problem of data collection; need to rely upon a repeatable and adaptable process for measuring the case study.
6. Concluding Remarks

- Future lines of Research:
  - Expansion the analysis to new sets of data with the objective of verifying the results that were obtained in this study.
  - Implementation of a new analysis on a sample obtained from expert measurers;
    - Analyze the dispersion produced for the sample to show that it is lower than the dispersion produced for the sample of this paper (low experience).
Thank you!

Questions?

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