Identifying Computer-Aided Design Action Types from Professional User Analytics Data

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Introduction

- Take inspiration from self-reported personality tests which provide insights to behaviour patterns.
- Propose framework derived from observed behaviour to analyze contributions to computer-aided design work.
- Framework serves as the basis to **better delegate/ coordinate work**, and to **better chart learning trajectories**.

Methodology

Collaborated with industry partner

- Builds automated cleaning robots in commercial spaces
- Adopted Onshape in April 2020 with 8 users in the server

Received server activity documenting events

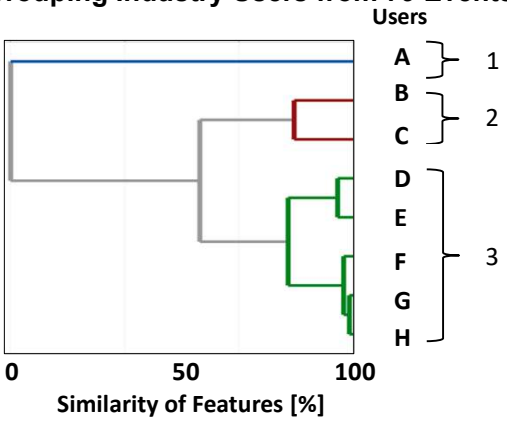
- Create Document, Add/Modify Sketch, Create Folder, etc.

Analyzed daily user activity using hierarchical clustering

- Creates groups according the proximity of time of events

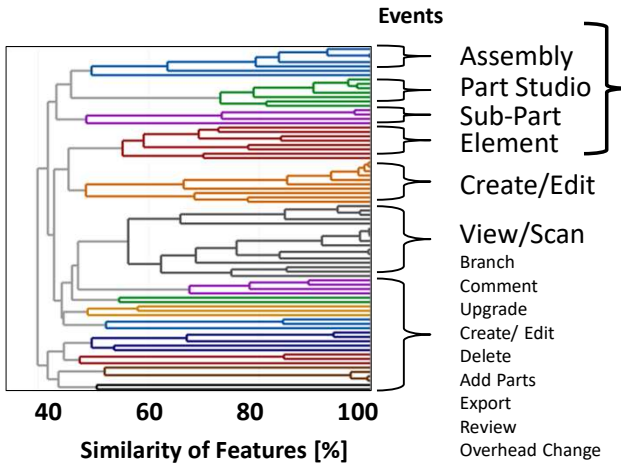
Results and Discussion

Grouping Industry Users from 79 Events



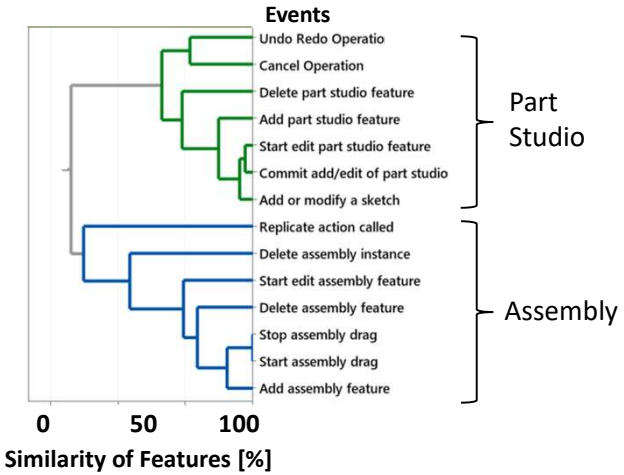
- Clustering of users reveals 3 distinct groups
- User A exhibits unique behaviour
- User B and C have similar work patterns

79 Events Grouped into 14 Clusters



- Identified 14 groups that in which variables occur close in proximity in time
- Assigned descriptive titles representative of the cluster contents

Events Divided into Clusters



- Closer look at the groups reveal events that are likely to occur closely together in practice
- Categories are used to develop user behaviour breakdowns

Type Breakdown for Onboarding New User

User	1 Assembly	2 Part Studio	3 Sub Part	4 Element	5 View/ Scan	6 Branch	7 Comment	8 Upgrade	9 Create/ Edit	10 Delete	11 Add Parts	12 Export	13 Review	14 Overhead Change	Total
New Employee															
X	1.12	3.26	0.14	28.64	52.79	0.47	2.74	2.78	4.46	0	0	1.37	2.1	0.14	100
Designers															
B	3.17	8.26	0.13	45.23	29.74	0.02	0.13	0	11.58	0	0.62	0.22	0.06	0.83	100
C	4.17	13.39	0.02	55.54	17.58	0.02	0.19	0	8.29	0	0.26	0.08	0.03	0.42	100
Reviewer															
E	4.85	4.49	0.02	24.54	58.62	0.11	1.23	0	4.61	0.24	0.35	0.48	0	0.44	100

- Users B and C exhibit similar behaviour distributions
- *Designers* exhibited more active actions while *Reviewers* performed more passive/reactive commands
- Framework can be used as tool to onboard and teach newer users

Conclusion

- Industry partner **corroborated** our initial conclusions.
- Identified roles from **active and passive behaviours.**
- **Developed a framework** that can be used to further indicate how **users should adapt to a new role**.