Quantifying regularity is the main objective of this work. We introduce methods to detect repeating patterns in timing of user’s activities in a weekly or a daily basis. Given the set of timestamp of user’s activities, (1) we binarize the activity sequence of the user to represent when (s)he was online during a certain period. We then introduce three sets of regularity measure. In the first approach, (2) we collapse the binary activity signals into hourly/daily histograms. If user’s activities are concentrated around a particular weekday/hour, this would emerge as a peak in the corresponding histogram. (3) To detect such patterns we propose entropy-based measures. In the second approach, (4) we build weekly profiles, which show for how many hours the user was online at a certain day in each week. If the user has a certain weekly time schedule, this would appear as similar rows in the weekly profiles. (5) To detect this pattern, we propose weekly similarity measures. In the third approach, (6) we apply fourier transform on the binary activity signals to obtain its frequency-domain representation (periodogram). A periodic pattern in user’s activity signal, would appear as a spike in the periodogram at the corresponding frequency (7) We introduce frequency-based measures to capture such patterns.

**Results:** We applied the proposed methods to quantify regularity level of over 10,000 learners in a MOOC course and showed that regularity is a predictor of achievement level. The introduced measure are applicable in different contexts and online platforms and reflect the predictability of users interaction patterns [*].

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**Entropy-based Measures**

Detect strong peaks in activity histograms

\[EW = -\sum_{d=1}^{7} \hat{W}(d) \ln(\hat{W}(d))\]

\[CWD = (\ln(7) - EW) \max(W(d))\]

**Profile Similarity Measures**

Detect similar rows in weekly profiles matrix

\[Sim_B(\overline{P}_i, \overline{P}_j) = \frac{|A_i \cap A_j|}{|A_i \cup A_j|}\]

\[Sim_B(\overline{P}_i, \overline{P}_j) = 1 - \frac{1}{|A_i \cup A_j|} \sum_{d=1}^{7} \left(\frac{P_{id} - P_{jd}}{P_{id} + P_{jd}}\right)^2\]

**Frequency-based Measures**

Detect spikes in frequency domain signals

\[F(\theta) = \sum_{t=0}^{N-1} X(t) e^{-i2\pi t \theta / N}\]

\[PWD = F_d(1/week)\]