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Supplemental Material: C-LOD: Context-aware Material Level-of-Detail applied to Mobile Graphics

G. A. Koulieris[1], G. Drettakis[2], D. Cunningham[3] K. Mania[1]

[1]Technical University of Crete, Greece [2]Inria† [3]Brandenburg Technical University Cottbus, Germany

Abstract

This document contains supplemental materials for the paper "C-LOD: Context-aware Material Level-of-Detail applied to Mobile Graphics". It contains additional details describing the weight generation of our perceptual study.

Categories and Subject Descriptors (according to ACM CCS): I.3.3 [Computer Graphics]: Picture/Image Generation—Graphics systems and interfaces

1. Weight Generation

The w_{sem}, w_{phy}, w_{cnt} and w_{cfr} weights are estimated by re-calibrating and merging the data from [KDCM14] with our experimental results. The relative increase in task completion time for each condition will be used to generate the weights for each factor.

Note that in our experiment all object placements were contextually consistent and physically compound. That is, [KDCM14]'s factors were held constant. Since these factors were the same in all conditions, the difference in completion time between conditions can not have been influenced by these factors. Likewise, in [KDCM14] all objects were in a canonical form. When their object were physically compound, they were always also contextually compound. Again, since these two factors did not differ between conditions, they can not have influenced the differences in completion times between conditions.

It is important to mention that there is a baseline condition that is the same in both experiments. The physically compound/consistent condition of [KDCM14] is identical to our contextually compound/canonical condition. To re-calibrate the data, we divide the actual means of [KDCM14]'s conditions by the predicted value for this baseline condition (140.581). The means for the singleton/Consistent, Singleton/Incosistent, Compound/Consistent, and Compound/Inconsistent conditions, were 64.81, 72.10, 135.03 and 164.5, respectively. After normalization, these values become 0.46, 0.51, 0.96, and 1.17. By examining how changing from schema-inconsistent to schema-consistent for physically singleton objects ($0.51 - 0.46$) and for physically compound objects ($1.17 - 0.96$), we can determine the average effect of schema consistency (0.13). Likewise, the increase due to going from physically compound to physically singleton for consistent objects is $0.96 - 0.46$ and for inconsistent objects is $1.17 - 0.51$, given an average change of 0.58. The total time difference between slowest and fastest conditions ($1.117 - .46$) is .71. Thus, physical isolation accounts for $.58/.71$ or 82% of the time change. Weights of .82 and .18 are not so different from the .95 and .05 used by [KDCM14].

The completion time for the baseline condition was predicted to be 161.238 in our work. Dividing the means in our four conditons (167.788, 255.386, 82.189 and 195.985 for the compound/canonical, compound/non- canonical, singleton/canonical, and singleton/non-canonical conditions, respectively) gives normalized completion times of 1.04, 1.58, 0.51 and 1.22. Thus, the increase due to canonical form for contextually compound objects is $1.58 - 1.04$ and for contextually isolated objects is $1.22 - 0.51$, giving us an average difference of 0.63. Likewise, the decrease due to contextual singletoness is the average of the differences for canonical ($1.04 - 0.51$) and non-canonical objects ($1.58 - 1.22$), which is 0.45. We then ensure that all weights sum to one by dividing them by the current sum (1.79).

The final weights are 0.07 for schema, 0.33 for physical isolation, 0.35 for canonical form and 0.25 for contextual isolation.

† Inria authors are at REVES/Inria Sophia-Antipolis Méditerranée.

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References

[KDCM14] KOULIERIS G. A., DRETTAKIS G., CUNNINGHAM D., MANIA K.: *An Automated High Level Saliency Predictor for Smart Game Balancing*. Tech. rep., Technical University of Crete, 2014. 1

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