
Datasheet for RenderMe-360

1 Motivation

2 Q1: For what purpose was the dataset created?

3 RenderMe-360 is a head-oriented, large-scale, high-resolution, and multi-sensory 4D human head
4 dataset with rich annotations. It is created as a comprehensive digital asset library, to ensure the
5 compatibility of evaluating multiple head avatar tasks in one single dataset. Before the curation of
6 RenderMe-360, the publicly available datasets can only support research on a small set of problems.
7 These datasets are either limited in resolution due to non-head-oriented capture system, or suffer
8 from data volume and diversity. With the release of RenderMe-360 dataset, researchers could train
9 their models with more robust data prior learned from our data, or evaluate their algorithms with
10 more exhaustive observations.

11 Along with the data, we also provide benchmarks on five vital tasks, *i.e.*, novel view synthesis, novel
12 expression synthesis, hair rendering, head editing, and talking head generation. On the one hand, the
13 benchmarks uncover the strengths and flaws of state-of-the-art methods, which present many new
14 observations and challenges for the research community to catalyze future research on the human
15 head avatar. On the other hand, as no benchmark agreement for human head avatar research is
16 achieved across different institutions yet, we hope our attempt on the five vital tasks could provide
17 unified criteria or paradigms for this domain.

18 In a nutshell, we create RenderMe-360 to facilitate the development of advanced research on
19 high-fidelity head avatar synthesis, which spurs new opportunities not only from our formalized
20 benchmarks, but also alternative ones that the community might come up with from our dataset.

21 Q2: Who created this dataset (e.g., which team, research group) and on behalf of which entity 22 (e.g., company, institution, organization)?

23 This knowledge base was created by RenderMe-360 Team: Dongwei Pan (Shanghai AI Laboratory
24 and SenseTime), Long Zhuo (Shanghai AI Laboratory), Jingtian Piao (SenseTime and The Chinese
25 University of Hong Kong), Huiwen Luo (Shanghai AI Laboratory), Wei Cheng (Shanghai AI
26 Laboratory and SenseTime), Yuxin Wang (Shanghai AI Laboratory), Siming Fan (SenseTime),
27 Shengqi Liu (SenseTime), Lei Yang (SenseTime), Bo Dai (Shanghai AI Laboratory), Ziwei Liu
28 (S-Lab, NTU), Chen Change Loy (S-Lab, NTU), Chen Qian (Shanghai AI Laboratory), Wayne Wu
29 (Shanghai AI Laboratory), Dahua Lin (Shanghai AI Laboratory and The Chinese University of Hong
30 Kong), and Kwan-Yee Lin (Shanghai AI Laboratory and The Chinese University of Hong Kong).

31 Q3: What support was needed to make this dataset?

32 This work was funded by Shanghai AI Laboratory.

33 Q4: Any other comments?

34 No.

35 2 Composition

36 **Q5: What do the instances that comprise the dataset represent (e.g., documents, photos, people,**
37 **countries)?**

38 (1) Documents: The dataset consists of source video data (multi-view RGB frames, audio files), and
39 rich annotations (camera parameters, matting, 2d landmarks, 3d landmarks, FLAME parameters,
40 UV texture map, scan mesh, and text annotation). We process the data and package the data with
41 annotation together in the form of SMC files.

42 (2) Countries of captured subjects: the performers come from different countries all over the world.
43 The ethnicity covers White, Asian, Brown (Middle Eastern, Indian, and Latino), and Black.

44 **Q6: How many instances are there in total (of each type, if appropriate)?**

45 We provide human head assets from 500 different identities. The collected subjects vary from
46 different ages, eras, ethnicities, and cultures. Each subject is required to perform various motions
47 with respect to expression, hair movement, and speech activities.

48 (1) Overall data volume: we provide 243+ million frames in full-head level and over 800k video
49 sequences captured from multi-view cameras. Along with the dataset, we provide rich annotations.
50 For per-frame, we provide annotation of camera parameters, matting, and facial 2D/3D landmarks.
51 The expression data includes additional action unit annotation. For key frames of each identity, we
52 provide FLAME parameters, UV texture map, and scan mesh. The volume of these annotations is
53 over 600k, 600k, 6k respectively. In addition, per-id annotations also include text annotations, which
54 cover four major aspects, each identity contains 97 static facial features, 36 static information of
55 non-facial regions, 25 dynamic facial actions, and 74 – 84 dynamic video activity descriptions.

56 (2) Data volume for each type capture: The frame volume consists of more than 6000 expression
57 data, 1300 hairstyle capture data, and more than 20000 sentence collections. Please refer to Figure 3
58 in the main paper and Section 3 in the PDF file “Supplementary Materials” for more details.

59 **Q7: Does the dataset contain all possible instances or is it a sample (not necessarily random) of**
60 **instances from a larger set?**

61 We will provide all instances from our RenderMe-360 data repositories.

62 **Q8: What data does each instance consist of?**

63 We provide raw data and their associated annotations.

64 **Q9: Is there a label or target associated with each instance?**

65 Yes. We provide annotations in two levels – per-frame annotations, and per-id annotations. The
66 per-frame annotations are matting, camera parameters, 2d landmarks, and 3d landmarks. The per-id
67 annotations refer to the ones annotated on key frames of each identity, in which scan mesh, FLAME
68 parameters, UV texture map, and text annotations are included. The rich annotation is one of the
69 characteristics of our dataset.

70 **Q10: Is any information missing from individual instances?**

71 No. Note that, for performers who originally wear unique hair accessories or hairstyles that are
72 difficult to take off, the wig recordings are intentionally skipped.

73 **Q11: Are relationships between individual instances made explicit (e.g., users’ movie ratings,**
74 **social network links)?**

75 No.

76 **Q12: Are there recommended data splits (e.g., training, development/validation, testing)?**

77 We classify the dataset into three categories according to the complexity of texture and geometry,
78 which are *Normal Case*, *With Deformable Accessories*, and *With Complex Accessories*. Based on
79 different benchmarks, we further split the dataset into multiple subsets with different dimensions.
80 Detailed information could be found in the PDF file “Supplementary Materials”. Still and all, there
81 are many other possible usages of our comprehensive data repository. For example, one could use the

82 entire database for pre-training. We encourage researchers to creatively use our data according to
83 their experimental needs.

84 **Q13: Are there any errors, sources of noise, or redundancies in the dataset?**

85 Due to the hardware limitation, the recording data of a few subjects miss one or two camera views.
86 For more discussion, please refer to Section 2.2 in the PDF file “Supplementary Materials”.

87 **Q14: Is the dataset self-contained, or does it link to or otherwise rely on external resources (e.g.,
88 websites, tweets, other datasets)?**

89 Yes. The dataset is self-contained.

90 **Q15: Does the dataset contain data that might be considered confidential (e.g., data that is
91 protected by legal privilege or by doctor-patient confidentiality, data that includes the content
92 of individuals’ non-public communications)?**

93 No.

94 **Q16: Does the dataset contain data that, if viewed directly, might be offensive, insulting,
95 threatening, or might otherwise cause anxiety?**

96 No.

97 **Q17: Does the dataset relate to people?**

98 Yes.

99 **Q18: Does the dataset identify any subpopulations (e.g., by age, gender)?**

100 We provide basic information of each subject, like age, gender, ethnicity, height, and weight. Please
101 refer to Figure S14 in the PDF file “Supplementary Materials” for more details.

102 **Q19: Is it possible to identify individuals (i.e., one or more natural persons), either directly or
103 indirectly (i.e., in combination with other data) from the dataset?**

104 Yes. RenderMe-360 is a human head centric dataset for facilitating the development of advanced
105 research on high-fidelity head avatar synthesis. Thus, it is feasible to identify people via face
106 recognition. All performers have assigned files that consenting the data capture and release for
107 non-commercial usage.

108 **Q20: Does the dataset contain data that might be considered sensitive in any way (e.g., data
109 that reveals racial or ethnic origins, sexual orientations, religious beliefs, political opinions or
110 union memberships, or locations; financial or health data; biometric or genetic data; forms of
111 government identification, such as social security numbers; criminal history)?**

112 No.

113 **Q21: Any other comments?**

114 We call for responsible usage of the dataset for research purposes only.

115 **3 Collection**

116 The collection procedure and preprocessing are explained in detail in Section 2.2 and Section 3 of the
117 PDF file “Supplementary Materials”.

118 **Q22: How was the data associated with each instance acquired?**

119 The original data are captured directly from the subjects by multi-view cameras and audio equip-
120 ment. We get the annotation data with the help of our semi-automated annotation tools and manual
121 annotation.

122 **Q23: Over what timeframe was the data collected?**

123 The valid data were collected from August 2022 to May 2023.

124 **Q24: What mechanisms or procedures were used to collect the data (e.g., hardware apparatus
125 or sensor, manual human curation, software program, software API)?**

126 We set up a high-end data collection system, named POrrait Large-scale hIgh-quality Capturing

127 sYstem (POLICY), to capture the raw data. The details of the POLICY and collection procedures
128 refer to the Section 2.1 and 2.2 in the PDF file “Supplementary Materials”.

129 **Q25: If the dataset is a sample from a larger set, what was the sampling strategy (e.g., determin-
130 istic, probabilistic with specific sampling probabilities)?**

131 No.

132 **Q26: Who was involved in the data collection process (e.g., students, crowdworkers, contractors)
133 and how were they compensated (e.g., how much were crowdworkers paid)?**

134 The performers come from different professions to ensure the diversity of appearance. We employ
135 contractors for manual labeling. The data curation is done by RenderMe-360 co-authors.

136 **Q27: Did you collect the data from the individuals in question directly, or obtain it via third
137 parties or other sources (e.g., websites)?**

138 We ask each individual to perform under explicit instructions.

139 **Q28: Were the individuals in question notified about the data collection and use of their data?**

140 Each subject has signed the notification of the collection process, and data usage consent before data
141 capture.

142 **Q29: Any other comments?**

143 No.

144 **4 Preprocessing / Cleaning / Labeling**

145 **Q30: Was any preprocessing/cleaning/labeling of the data done(e.g.,discretization or bucketing,
146 tokenization, part-of-speech tagging, SIFT feature extraction, removal of instances, processing
147 of missing values)?**

148 Yes. We preprocess the raw data in the form of images and aligned audio. We clean the data which
149 do not satisfy our requirement by manually checking. We provide rich annotation of the dataset,
150 including camera parameters, human mask, FLAME parameters, 2d landmarks, 3d landmarks, UV
151 texture map, scan mesh, and text annotations.

152 **Q31: Is the software used to preprocess/clean/label the instances available?**

153 Yes. We will release our preprocessing and labeling tools on [https://github.com/
154 RenderMe-360/RenderMe-360](https://github.com/RenderMe-360/RenderMe-360).

155 **Q32: Any other comments?**

156 No.

157 **5 Uses**

158 **Q33: Has the dataset been used for any tasks already?**

159 In the experiment part of our paper, we evaluate the state-of-the-art methods in different tasks with
160 our collected dataset.

161 **Q34: Is there a repository that links to any or all papers or systems that use the dataset?**

162 N/A.

163 **Q35: What (other) tasks could the dataset be used for?**

164 Our data library is primarily intended to facilitate the development of advanced research on high-
165 fidelity head avatar synthesis. We set up example benchmarks on five vital tasks: novel view synthesis,
166 novel expression synthesis, hair rendering, hair Editing, and talking head generation. Other directions
167 related to human heads are also possible, such as text-to-3D human head generation, face parsing,
168 matting, *etc* .

169 **Q36: Is there anything about the composition of the dataset or the way it was collected and
170 preprocessed/cleaned/labeled that might impact future uses?**

171 Nothing we are aware of.

172 **Q37: Are there tasks for which the dataset should not be used?**
173 Any research that intentionally generates harmful or toxic content will be not condoned by us.

174 **Q38: Any other comments?**
175 No.

176 **6 Distribution**

177 **Q39: Will the dataset be distributed to third parties outside of the entity (e.g., company, institution, organization) on behalf of which the dataset was created?**
178
179 Yes, the dataset will be open-source.

180 **Q40: How will the dataset will be distributed (e.g., tarball on website, API, GitHub)?**
181 The dataset will be distributed by the tarball on the official website <https://renderme-360.github.io/>

183 **Q41: When will the dataset be distributed?**
184 A part of the dataset has been distributed on the official website, and the full dataset will be distributed
185 before the start of the NeurIPS conference.

186 **Q42: Will the dataset be distributed under a copyright or other intellectual property (IP) license, and/or under applicable terms of use (ToU)?**
187
188 Yes. The license of our dataset is Creative Common CC-BY 4.0 license <https://creativecommons.org/licenses/by/4.0/>

190 **Q43: Have any third parties imposed IP-based or other restrictions on the data associated with the instances?**
191
192 NO

193 **Q44: Do any export controls or other regulatory restrictions apply to the dataset or to individual instances?**
194
195 No.

196 **Q45: Any other comments?**
197 No.

198 **7 Maintenance**

199 **Q46: Who is supporting/hosting/maintaining the dataset?**
200 The RenderMe-360 team.

201 **Q47: How can the owner/curator/manager of the dataset be contacted (e.g., email address)?**
202 Please contact Dongwei Pan (pandongwei@sensetime.com), Long Zhuo (zhuolong@pjlab.org.cn),
203 Dahua Lin (dhlin@ie.cuhk.edu.hk), and Kwan-Yee Lin (linjunyi9335@gmail.com)

204 **Q48: Will the dataset be updated (e.g., to correct labeling errors, add new instances, delete instances)?**
205
206 Yes. If there is any update, we will make announcements on the official website <https://renderme-360.github.io/>.

208 **Q49: If others want to extend/augment/build on/contribute to the dataset, is there a mechanism for them to do so?**
209
210 Yes. We welcome contributors to communicate with us and leave any comments on the official
211 GitHub page <https://github.com/RenderMe-360/RenderMe-360>.

212 **Q50: Any other comments?**
213 No.