Should I take a walk? Estimating Energy Expenditure from Video Data

1、Motivation

虽然有一些穿戴设备可以测出人运动时的卡路里消耗，but sensors are not always present at hand or comfortable to wear, most people can easily access a video camera in their phone or laptop.

对于energy estimation这个事情来说，主要面临两个阻碍：

- Our task however requires ***fine-grained*** **understanding of human movement**
- encourage the model to **capture the essence of energy expenditure** instead of memorizing average values of specific activity categories seen during training.

好像跟AQA差不多，首先是要关注人物本身，其次是关注energy expenditure而不是简单的在动作内做平均。同时，作者希望模型达成的另一个目标是：great *generalization* to previously unseen types of activities

2、Vid2Burn

作者收集了一个新的数据集，叫Vid2Burn。

Datasets	**Vid2Burn-Diverse**	**Vid2Burn-ADL**	**Vid2Burn**
Video origin	Youtube/ movie datasets	ADL datasets	Youtube/ Movie/ADL
#Clips	4260	5529	9789
#Activities	33	39	72
#Train/test categories	27/6	33/6	60/12
Unit	kcal/hour	kcal/hour	kcal/hour
Min	64	153	64
Max	961	449	961
Mean	373	276	318

Table 1. An overview of the main properties of *Vid2Burn* and its two versions (including statistics of the caloric annotations).

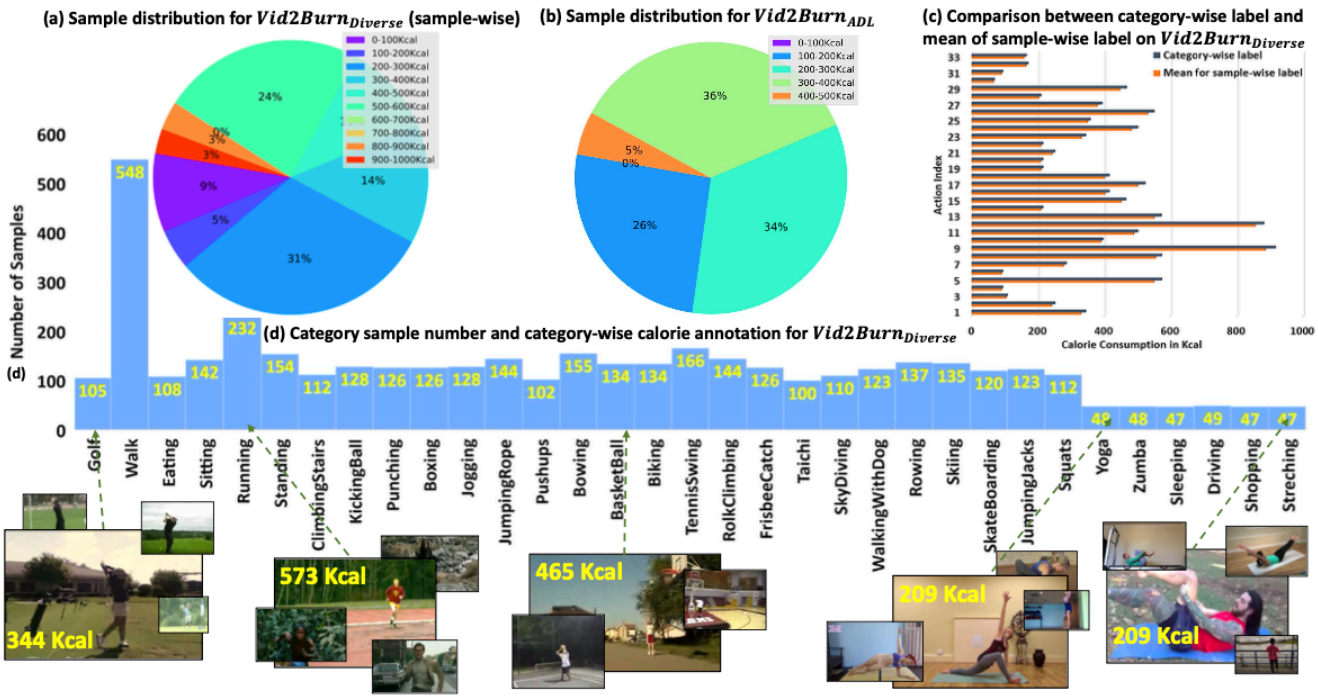


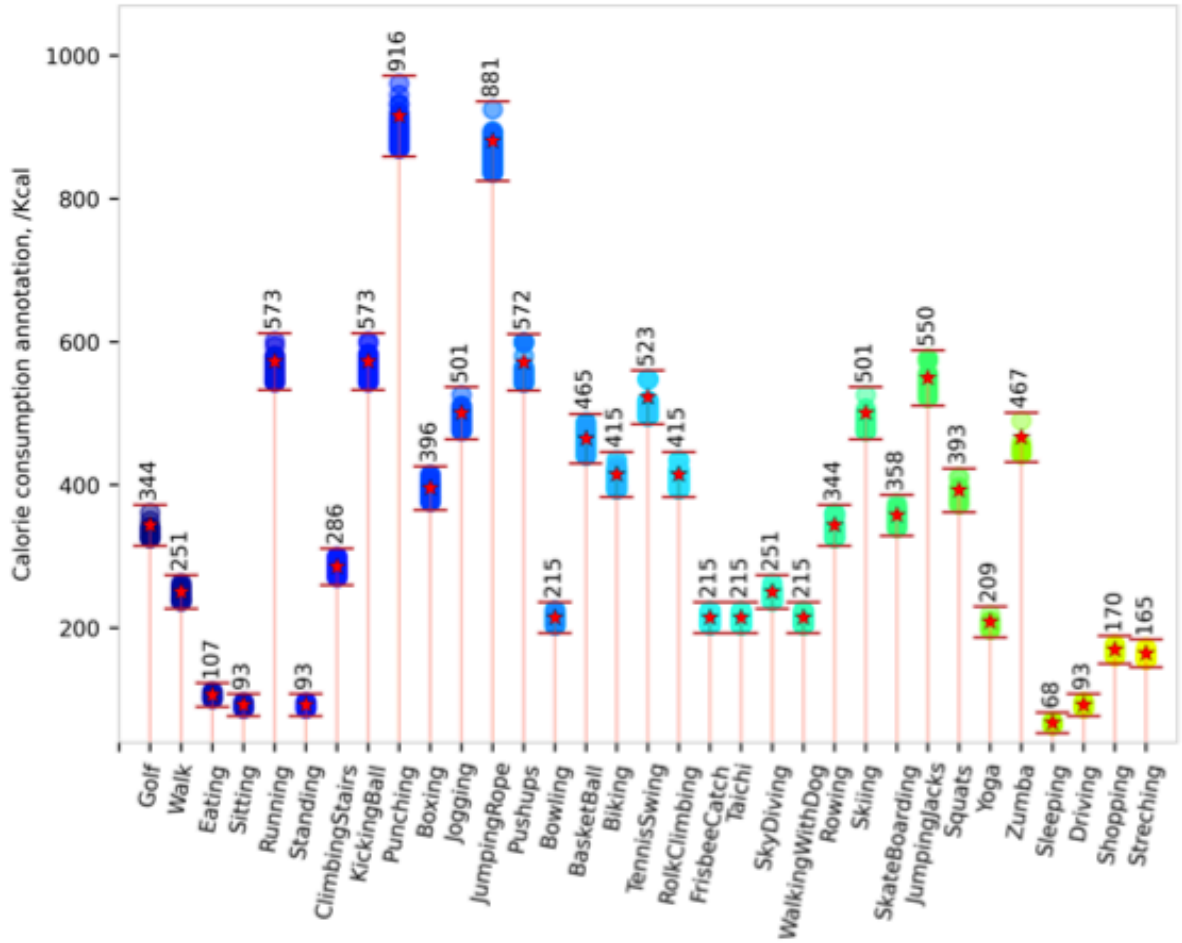
Figure 2. An overview of the dataset statistics. The statistics of the caloric cost values are summarized as pie charts in (a) and (b) for $Vid2Burn_{Diverse}$ and $Vid2Burn_{ADL}$ respectively. The caloric cost annotation statistics grouped by the individual activity categories are provided in (c), where blue bars represent the category-wise annotations, orange bars stand for the average of the sample-wise values and the bar index on the vertical axis indicates the action ID (which correspond to the order of activities listed below the blue histogram). The sample frequencies for different action categories in $Vid2Burn_{Diverse}$ are visualized in the blue bar chart (d) with multiple visual examples.

在这个完整的数据集上，作者将其分成了两个子集：

- **ViD2Burn-Diverse**：其中包含的是一些运动比较剧烈的，比较好用过过往方法测算GT的动作。这些动作的背景会比较多变，有各种各样的场景
- **VID2Brun-ADL**：这个子集里包含的动作背景比较单一，都是在相似的场景里拍摄的。而动作也是日常出现的动作，比如穿衣服、喝水。

标注方面：

- **ViD2Burn-Diverse**：首先查表看了Diverse子集中动作的平均卡路里消耗，如下所示



在此之后，使用movement的剧烈程度调整这个均值（文中的**Body movement- based annotations.**）

- **ViD2Burn-ADL**：将Heart-rate based annotations.和Body movement- based annotations结合起来

测试策略方面：

作者设计了两种testing scenarios：*Known activity types* evaluation和*unknown activity types* evaluation

具体的策略可以直接看文章，很好理解。

3、Activity Recognition Models in the Context of Caloric Cost Estimation

为了学到连续的卡路里分布，作者采用了跟USDL一样的策略。

实验部分就是跑一下各种backbone，暂时没发现很多可以挖掘的部分

不过对可视化比较好奇，怎么可视化激活情况呢?