



Socially-Aware Federated Learning

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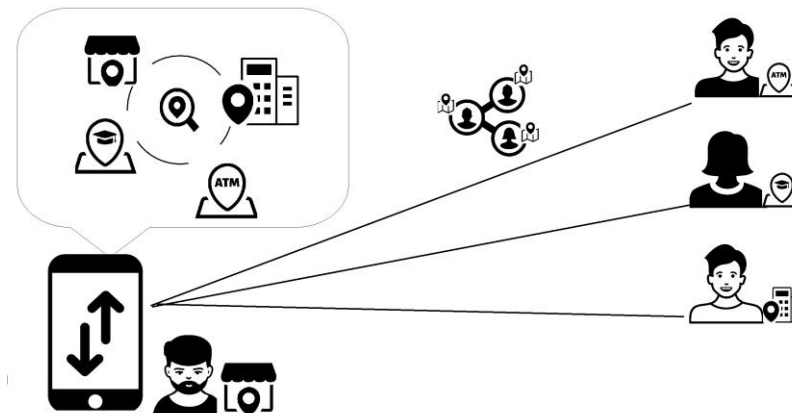
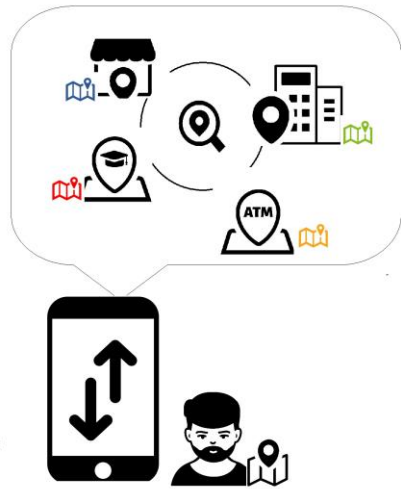
Introduction

Federated Learning (FL) technique

- ❑ Distributed privacy-preserving training of models
- ❑ Participatory contribution of data (federated samples)

Probable Issue:

- ❑ Data contribution issues relating to deficiency of contributors due to the unavailability of required resources for data contribution.



Social-Aware Federated Learning



- Social Aware Federated Learning (SAFL) aims to probe federated samples from individual users in a social context.

Contribution:

- investigate users' willingness to outsource federated sampling tasks within their social circle in situations when they lack the resources to contribute the right data.

Feasibility Analysis

Experimental Design

- we design a prototype of a mobile application that can be used to outsource micro-tasks to a list of available phone contacts.

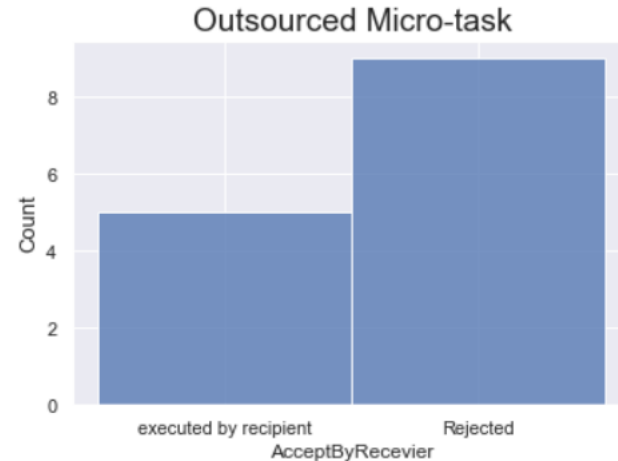
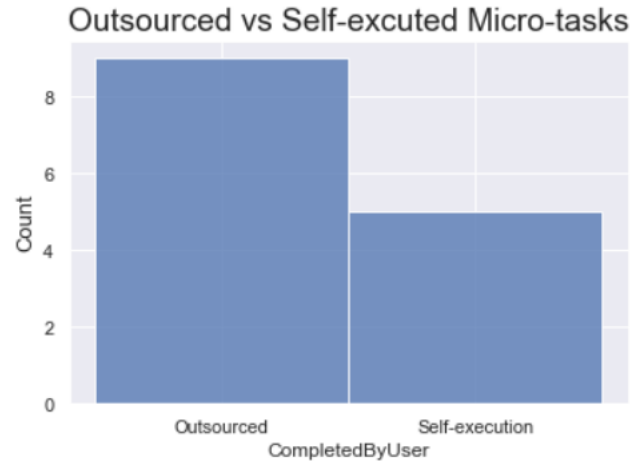
Apparatus

- We used three smartphone devices
iPhone, Xiaomi Redmi, CAT 5

Federated Sampling Task

- We offered four micro tasks requiring unique sensors for the contribution of data

Feasibility Results



From the figure:

- There is a willingness to share micro-task
- Willingness to perform allocated task
- All micro-task were outsourced

Experimental Set-up and Procedure

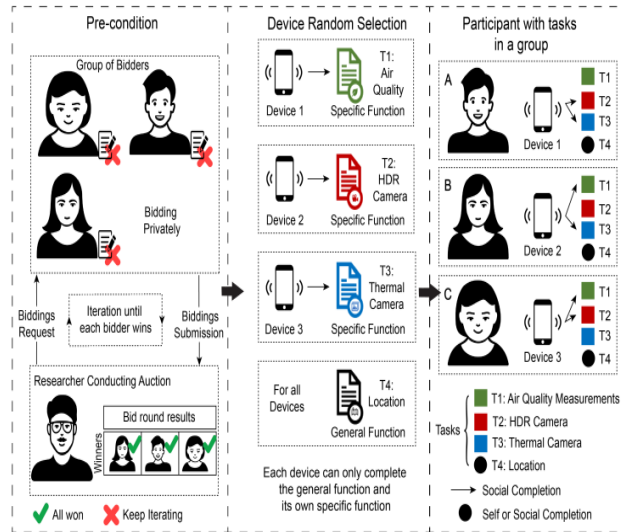
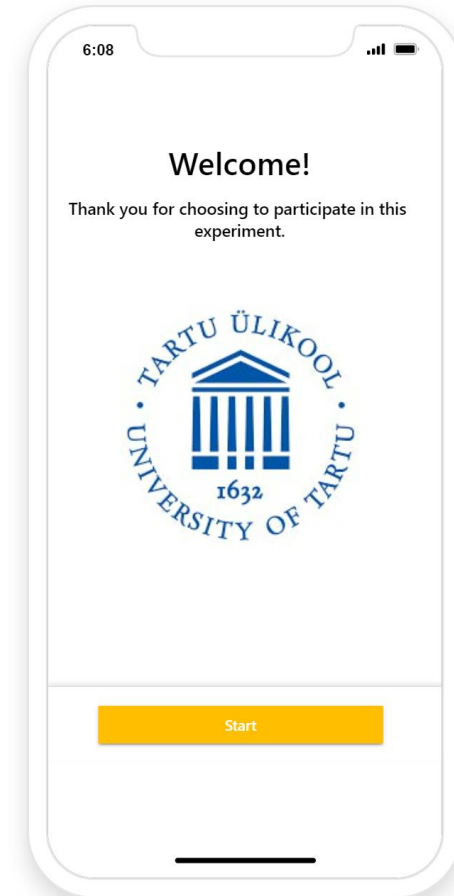
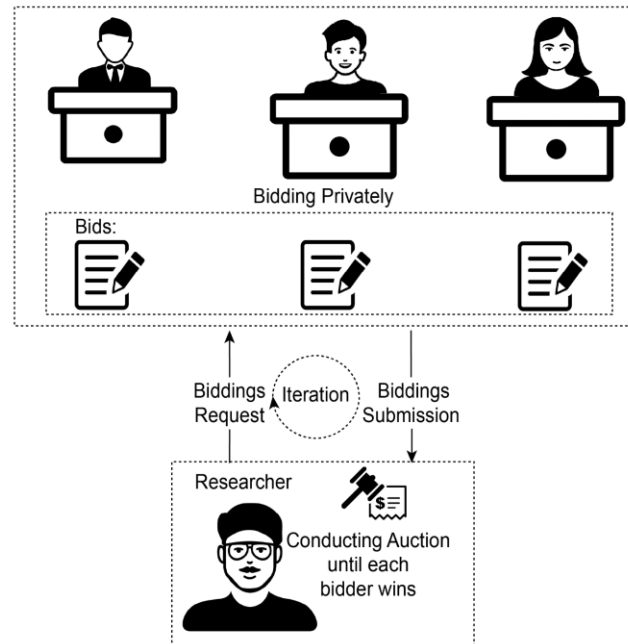




Fig. 1: Experimental procedure

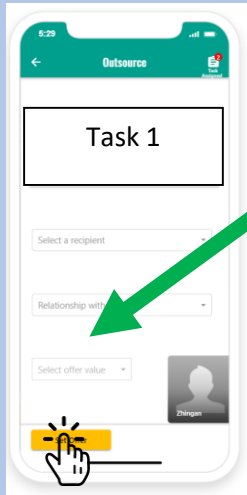


Part 2 – Mobile application (how to?)





From the task action page, click on outsource

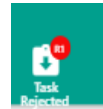


To outsource, the participant outsourcing selects the recipient, relationship and offer

Read the compensation you will get from the micro-task



Icons & Notifications




Notification icon for rejection of assigned micro-task by recipient participant.

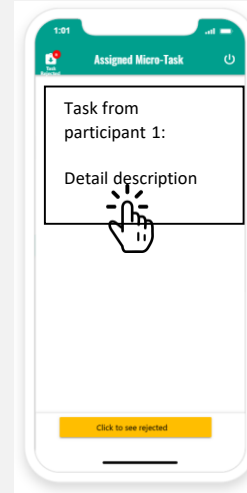


Notification icon for micro-task assigned by other participants

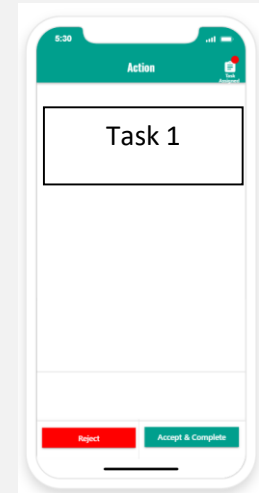


Log out icon





The recipient participant gets the notification and see the assigned task when the notification icon is clicked



The recipient can choose to reject or accept the assigned micro-task for completion.

Snippet of Dataset

Bids Value

Bidder1	Bidder2	Bidder3
20	5	20
20	5	5
4	15	20
5	1	3
2	2	5
1	29	1
7	0.5	2.5
0.5	1	10
0	0.25	2
1	0.2	4
5	1.5	1
10	1.2	10
2	2	5
5	5	15
10	30	20
8	2	8
8	2	10
2	2	8
1	5	5

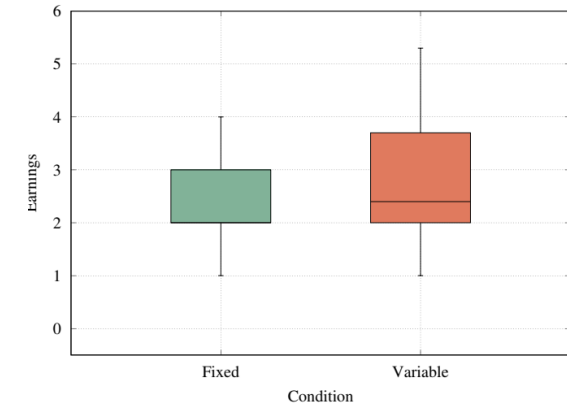
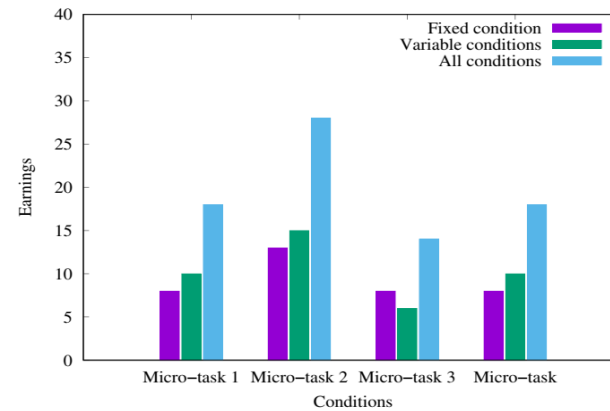
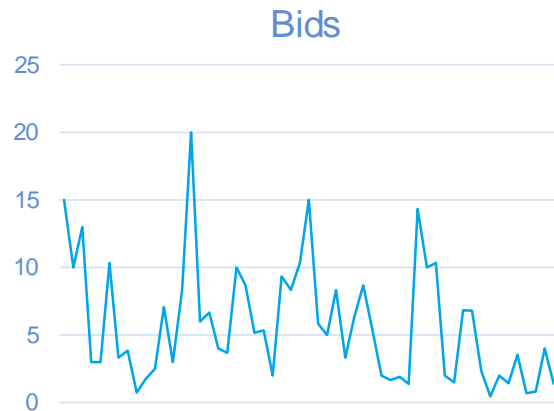
Micro-task execution

Name of Recipient	Task Allocator	Task ID	Assigned Task Description	AcceptByReceiver	CompletedByUser	Relationship	Actual Amount	Amount_Given
Participant 3	Participant 2	1	Microsoft wants you to use your mobile device to measure the air quality of the city.	1	-1		1	
Participant 1	Participant 3	4	Flir Technologies wants you to use your device to capture a thermal video of any bird at the botanical garden of the University of Tartu.	1	-1	Acquaintance	1	
Participant 1	Participant 2	4	Flir Technologies wants you to use your device to capture a thermal video of any bird at the botanical garden of the University of Tartu.	1	-1		1	
Participant 2	Participant 3	3	Estonian Culture Centre wants you to use your device to capture a high-quality picture of a basket of Estonian mushrooms	1	-1	Stranger	1	
Participant 2	Participant 2	3	Estonian Culture Centre wants you to use your device to capture a high-quality picture of a basket of Estonian mushrooms	0	1		1	
Participant 3	Participant 3	2	Google wants you to use your google map to validate the names of pubs and restaurants in your location.	0	1		1	
Participant 2	Participant 2	2	Google wants you to use your google map to validate the names of pubs and restaurants in your location.	0	1			
Participant 3	Participant 3	1	Microsoft wants you to use your mobile device to measure the air quality of the city.	0	1		1	

Preliminary Experimental Results

On-going analysis for the main

Bidding Value



Correlation of earnings within each condition

Earnings	Variable Condition		
	Self completion	Outsourced	Total
Self Completion	1	0.50	0.67
Outsourced	0.50	1	0.87
Total	0.67	0.87	1

TABLE II: Correlation (Kendall) coefficient (τ) analysis for all earnings in the variable condition

Earnings	Fixed Condition		
	Self completion	Outsourced	Total
Self Completion	1	0.22	0.64
Outsourced	0.22	1	0.75
Total	0.64	0.75	1

TABLE I: Correlation (Kendall) coefficient (τ) analysis for all earnings in the fixed condition

Thanks ...