From Commission for Developing Countries
Grant Selection Committee

IMU Simons African Fellowship Program

INTERNATIONAL MATHEMATICAL UNION

Commission for Developing Countries
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IMU-CDC Individual Research Travel Support Program
Activity Reporting Form

Name of Grantee: **Deborah Olayide AJAYI**
Home Institution And Country Of Grantee: **University of Ibadan, Ibadan NIGERIA**
Name of the Host: **Professor Ulrike Tillmannn**
Name of the Host Institution and Country: **Institute of Mathematics, University of Oxford, Oxford, United Kingdom.**
Topic of the Research Activity: **Persistence approach to homology, cohomology, Stiefel-Whitney classes and applications in topological data analysis**
Dates spent Center/Host Institution: **15 May, 2021 - 28 June, 2021**

- Summary statement of major outcome of my visit:
  The visit granted me the opportunity of grasping an extensive view and surveying the state of the art of persistence approach to homology and cohomology including the computational aspect in topological data analysis. These have not just yielded results to be published, but has enriched and enhanced my academic and professional career which will in turn affect my collaborators especially in Nigeria.

- Brief description of my research activities during the research visit:
  Due to COVID-19 restrictions most of my research activities were virtual. My host and I had regular meetings, (both virtual and physical) where we had fruitful discussions on persistence theory and topological data analysis. She also Introduced me to Dr Barbara Mahler a former PhD student of hers, with whom I had regular (physical) meetings on computational aspects of persistence. She specifically put me through the Ripser package for Python. My host, Barbara and I had meetings to discuss progress made and deliberate on research ideas. I attended seminars (virtually) regularly on Wednesdays at 2pm and Fridays 3pm of Manifold learning group and TDA group respectively. Through the meetings we had fruitful deliberations on research Ideas. I also presented a talk on 18 June, 2021, at one of the group meetings of the Center for Topological Data Analysis. The participants include members of the group from Oxford University, Swansea University and University of Liverpool.

- Students and post-doctoral fellows advised: None

- Joint activities with my host:
  The visit started with regular scheduled meetings (online) with my host where we brainstormed on viable research problems. We continued by identifying some projects and working on two specific research projects for publication.

- Research in progress (as a result of the visit)
  We are presently working on the topological analysis of voting pattern in Nigerian elections and writing up another article on persistent cohomology for publication.

- Publication of papers as a result of the research visit are in progress

- Planned future activities as a result of the research visit
  We plan to have a TDA school in Nigeria, continue the collaborative research work and present our result at the international conference on TDA in Oxford coming up next year.

With my signature I agree that my Activity Report and pictures can be published on the CDC website.

Date: 20 July, 2021

Signature: