ISFINTECH

SHORT PRESENTATION

The project proposes to realise a proof of concept, and later hopefully a prototype, of linguistic, economic and semantic analysis that starts from the automatic interpretation of the users' needs (in Arabic, English and Italian) and of the norms of Islamic legal sources and translates current FinTech transactions of traditional finance into equivalent transactions that ensure to be compliant with Islamic finance norms, producing proposals to the customer entered through a chatbot in natural language using Artificial Intelligence and Machine Learning techniques. The Arabic-speaking customer will then be able to choose to adhere to the Islamic finance or traditional finance proposal by displaying the relevant conditions via a smartphone app or webpage.

The project stems from the IsFinTech research group's development of a project of major national interest (PRIN) .

The group consists of three research units, at the Universities of Roma Tre (directed by Giuliano Lancioni), IULM (directed by Manuela Giolfo) and Milano-Bicocca (directed by Francesca Magli). The group at Milano-Bicocca deals with the analysis of financial instruments from a FinTech and RegTech perspective.

The applications of the generative AI model of which we have developed a prototype are:

1) customer onboarding for traditional and Islamic banking services.
2) Certification of halal financial products.
3) Inclusion of Arabic-speaking customers in the financial system.
4) Automation of the onboarding process through a chatbot with generative AI.

What are we looking for?
We are looking for funding to further develop the prototype (i.e. to finance research grants and the purchase of computing power) and contacts to be able to refine the generative AI model in partnership with financial institutions or companies that would need this type of RegTech solution also in fields other than finance (tlc, security, third sector by way of example).

ISFINTECH

FULL PRESENTATION

INTRODUCTION

The model proposes to realise a proof of concept, and later hopefully a prototype, of linguistic, economic and semantic analysis that starts from the automatic interpretation of the users' needs (in Arabic, English and Italian) and of the norms of Islamic legal sources and translates current FinTech transactions of traditional finance into equivalent transactions that ensure to be compliant with Islamic finance norms, producing proposals to the client entered through a chatbot in natural language by means of Artificial Intelligence and Machine Learning techniques. The Arabic-speaking customer will then be able to choose to adhere to the Islamic finance or traditional finance proposal by displaying the relevant conditions via a smartphone app or webpage.

The project stems from the IsFinTech research group's development of a project of relevant national interest (PRIN) funded by the MUR (Ministry of Universities and Research) that aims to create a proof of concept, and later hopefully a prototype, of linguistic, economic and semantic analysis that starts from the automatic interpretation of users' needs (in Arabic, English and Italian) and of the norms of Islamic legal sources and translates current FinTech transactions of traditional finance into equivalent transactions that ensure compliance with Islamic finance norms,

The group is composed of three research units, at the Universities of Roma Tre (directed by Giuliano Lancioni), IULM (directed by Manuela Giolfo) and Milano-Bicocca (directed by Francesca Magli and with Luca Federico Battanta collaborating). The group at Milano-Bicocca deals with the analysis of financial instruments from a FinTech and RegTech perspective, the group at IULM with the linguistic analysis of texts and customers' spontaneous language productions on social media, the group at Roma Tre with the realisation of ontologies and the computational linguistics model.

The process, which takes customer texts and regulations as input, constructs a reasonable ontology of financial entities and applies a set of rules to these entities in order to output a traffic light response on the acceptability of a given financial transaction from the perspective of Muslim law. (which already grades the acceptability of a practice on a scale ranging from the obligatory to the forbidden, via the praiseworthy, the neutral, and the reprehensible).

The aim is to automate the onboarding process through a chatbot with generative artificial intelligence.

THE PROJECT
The basic idea of the project is to realise a prototype that, starting from a text entered by the customer and a contract hypothesis entered by the bank or financial institution through a financial promoter or a member of an NGO, by means of artificial intelligence, then verifies 1)through a system of financial ontologies and a series of axioms and deductions, whether the transaction is in accordance with Muslim law, signalling it through a traffic light scale indicating the degree of compliance with shariah, proposing both traditional and Islamic finance alternatives by displaying possible solutions and products on the screen first of the financial promoter and then of the customer.

2) Upload the correct data entered by the customer through a consultant, speaking the customer's language, and process it in order to provide the correct business solutions.

3) At a later stage, the data will be uploaded independently by the customer within the application designed for Smartphone and iOS and Android tablets or a web page.

The prototype will have a user interface in the form of an app linked to the project website.

The application will first be targeted as business to business and then

It will suggest not only traditionally inclusive products such as microcredit (already widespread in Egypt, for example) and electronic payment methods, but also alternative strategies to make certain financial transactions acceptable, for example a transaction in which there is a formally non-legal interest according to Islamic finance rules.

APPLICATIONS OF THE AI MODEL

The applications of the generative AI model are:

1) customer onboarding for traditional and Islamic banking services.
2) Certification of halal financial products.
3) Inclusion of Arabic-speaking customers in the financial system.
4) Automation of the onboarding process through a chatbot with generative AI.

INTERCONNECTION BETWEEN ECONOMIC/FINANCIAL AND LINGUISTIC OBJECTIVES

The linguistic and financial objectives of the project are closely interconnected and feed off each other. The annotated corpus constitutes the primary source for the construction of the basic lexicon, which in turn determines the annotations of lemmas and glosses in the corpus. Furthermore, links between corpus, lexicon and external resources are gradually built and specified as the
as the project develops, which implies periodic testing and correction of the same lexical model.
lexical model.

The semantic structure is based on a series of ontologies (= formal representations of a conceptual universe) representing
- financial system entities, their attributes and relationships (based on the standard industry standard FIBO, Financial Industry Business Ontology, in OWL);
- rules imposed by existing laws and regulations;
- rules of Islamic finance;
- policies implemented by the specific institution (bank/financial/insurance).
The Islamic finance ontology is based on a semi-automatic procedure:
- a basic ontology is prepared from Islamic finance textbooks, linking it to general ontologies (FIBO);
- the basic ontology is incrementally extended from the automatic analysis of legal/financial legal/financial reference texts;
- verifying the completeness of the ontology on texts not yet analysed, integrating missing concepts and relations;
- a database of rules is implemented in the same format as the 'non-Islamic' RegTech inserting additional/complementary restrictions ;
- a series of legal 'way' rules are created (mainly from manuals), which translate practices rejected by the 'Islamic' RegTech into terms of rules that are Islamically correct.
The approach to linguistic analysis is on a symbolic basis, by means of grammars based on Grammatical Framework, which connect different versions in the languages included in the project to a single semantic representation. Grammatical Framework, originally developed in Haskell, but with interfaces in Java, C++ and Python (the version used by IsFinTech), has the advantage of being a declarative and fully lexicalised system: all morphological syntactic and semantic information is associated with the lexical entries, in a very flexible manner and without procedural instructions.
In this way, a series of parallel grammars in the implemented languages (2 to n) realise transducers from/to universal semantic structures and specific language structures: a single abstract grammar encoding semantic units (corresponding to ontologies) and their types, and a series of concrete grammars enabling the parsing of natural language texts by returning semantic representations and the generation of natural language texts from semantic representations.
Translation from one language to another in this framework is an epiphenomenon produced by independent parsing and generation processes: it is sufficient to create n grammars for n languages, not n×n translation grammars.
A neural component is used as an escape hatch for cases in which the grammar fails to parse the input or produce an output on the basis of the semantic representation, and thus aims to mitigate the typical rigidity problems of symbolic grammars (which are however preferable for interfacing linguistic forms with a formal ontology).
As for the RegTech component, the relationships between ontologies are complemented by a component that implements rules at different levels (global/international/national/company).
Ontologies and rules are implemented in terms of theorem provers: given a set of axioms and complex relations, one can automatically check whether an assertion (=transaction) is accepted or rejected by the system.

THE ADVANTAGES OF ISFINTECH

- first contact with Muslim customers who do not use or use marginally banking/insurance/finance and not fully included in the financial system e.g. female integration and financial independence.
- direct interaction in the language(s) of the Arab client and in the future other languages of Islamic majority countries.
- gain in credibility of the financial institution with Muslim (or 'Islamic') customers or ethical financial services even those not interested in Islamic finance products, but who view the culturally respectful orientation of the system positively.

THE ECONOMIC AND SOCIAL INCLUSION IMPACT OF ISFINTECH

The realisation of the prototype from the proof of concept goes through a series of reasonable and theoretically desirable objectives
- to build a simplified model that addresses a number of typical scenarios in a consistent consistent manner;
° improve financial education and economic independence through technology for the younger generation and Muslim migrant women.
- demonstrate the feasibility and scalability of the system;
- identify an external partner interested in developing a prototype to be proposed to a specific target clientele;
- set up an academic start-up to implement a marketable version.

The solution proposed by the project will have a number of potential targets: Muslim users in Western markets and in countries with an Islamic majority, tools for financial inclusion through the
technological solution explained above of the unbanked who are currently on the margins of the
financial system.

THE SDG OBJECTIVES:

The goals we want to achieve on the basis of the SDG targets are :
-1 Overcoming poverty.
-8 Decent work and economic growth.
-5 Gender equality.
-4 Quality education (financial but also start-up).
-9 Financial industry innovation through digitisation.
-11 Sustainable cities and communities through credit support and financial education.
-12 Responsible consumption and production for investment products and microcredit.
-17 Partnership for goal between universities and the financial world.